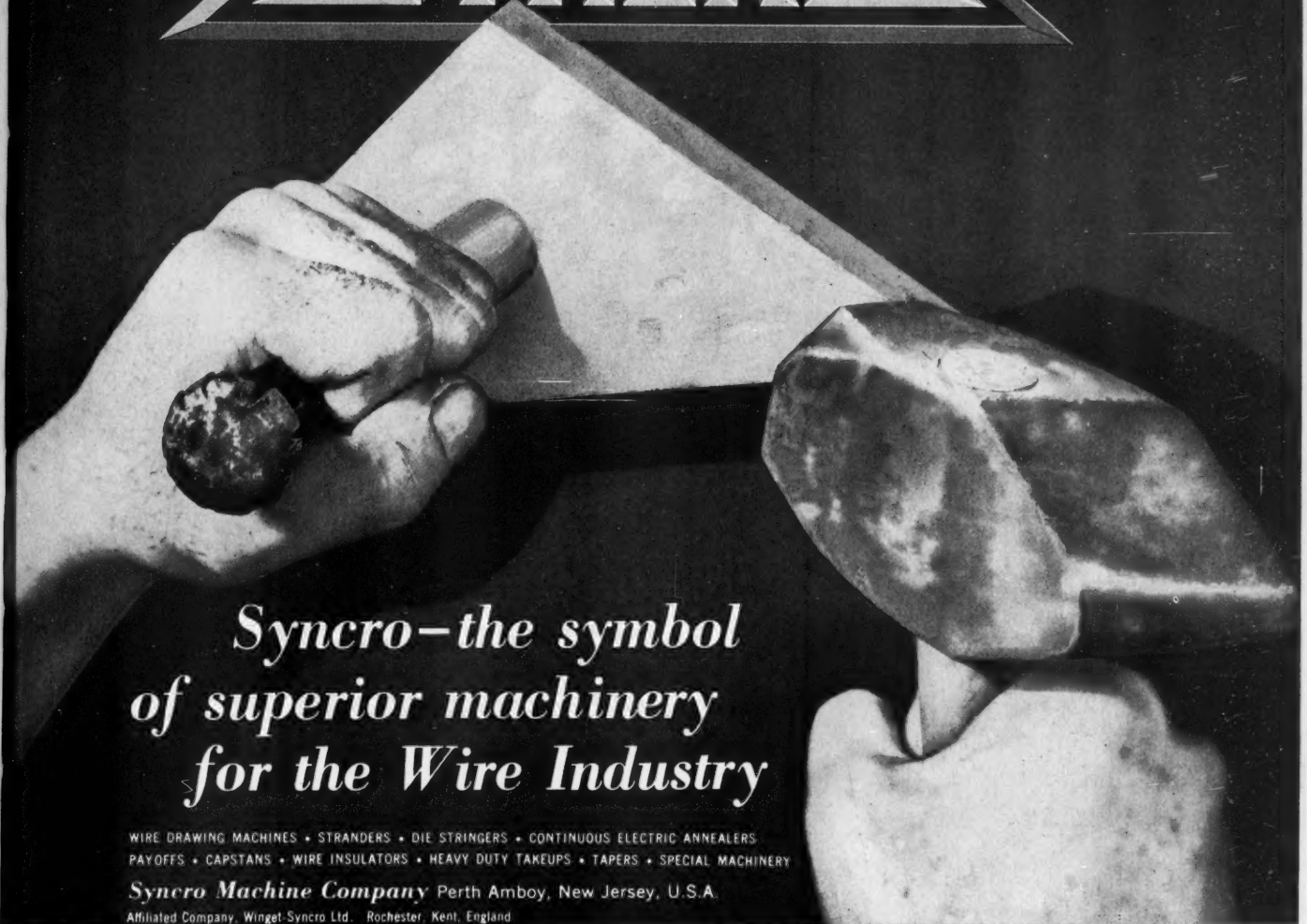
WIRE AND WIRE PRODUCTS

FEBRUARY 1955

SYNCRO®



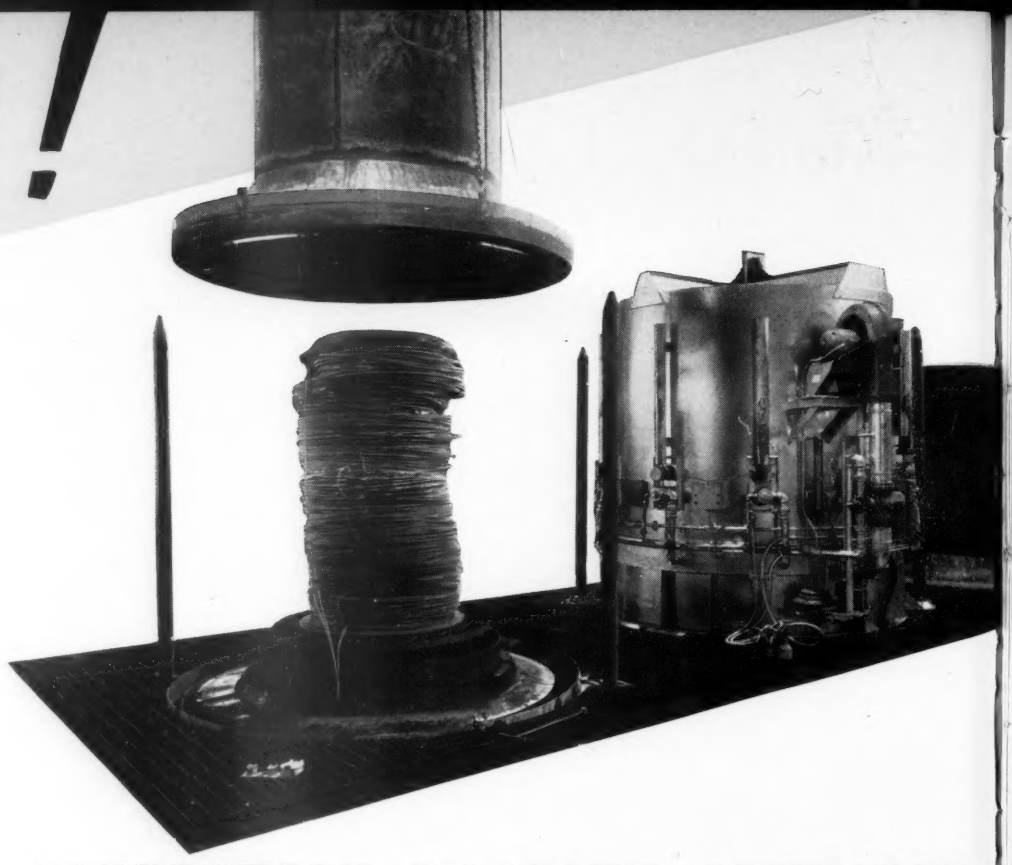
Syncro—the symbol of superior machinery for the Wire Industry

WIRE DRAWING MACHINES • STRANDERS • DIE STRINGERS • CONTINUOUS ELECTRIC ANNEALERS
PAYOFFS • CAPSTANS • WIRE INSULATORS • HEAVY DUTY TAKEUPS • TAPERS • SPECIAL MACHINERY

Syncro Machine Company Perth Amboy, New Jersey, U.S.A.
Affiliated Company, Winget-Syncro Ltd. Rochester, Kent, England

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

NEW!



The new Lee Wilson High Convection Radiant Tube Rod and Wire Annealing Furnace employs high velocity circulation propelled by fans with up to 25 HP motors. On the charge of rod pictured here the time-to-temperature when spheroidizing soak begins was but 2 hours.

FIRST HIGH CONVECTION RADIANT ANNEALING FURNACE For ROD and WIRE GOES into OPERATION

The first complete high convection radiant annealing furnace expressly designed for wire and rod annealing was recently sent into operation at the Port Chester, N. Y. plant of the Russell Burdsall & Ward Bolt and Nut Company.

The result of years of research and development the furnace, designed and built by Lee Wilson, adapts the principle of modern strip coil annealing to the production of wire and rod.

The furnace has a specially designed charge support or diffuser assembly that derives maximum efficiency from the high velocity circulation system. It actually sets up a secondary induced circulation of the hot gases *down* through the "eye" of the coil. This means the coils reach temperature faster — greatly reducing heating time. This secondary circulation works with a single stack of rod or a multiple stack of wire.

The Lee Wilson high convection wire and rod annealing furnace incorporates the popular Lee Wilson "O" type radiant tube which means more heat faster, with considerably more control than is possible with standard heating elements.

But get the entire story . . . write Lee Wilson Engineering today for the last word on modern wire and rod annealing systems.

The furnace is equipped with Lee Wilson "O" type radiant tubes — the most efficient tube of its kind on the market today. The use of the "O" tube means greater total fuel input, faster heating, better uni-

Lee Wilson

ENGINEERING COMPANY, Inc.

20005 WEST LAKE RD., CLEVELAND, OHIO

"America's Finest
Wire Drawing Lubricants"

Presenting:

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SERVICE INCOMPARABLE
SALES INTEGRITY
SOAPS IMPERIAL

>>> NEW <<<

NO. 21-WAX OUTSTANDING IN ITS FIELD

NO. 55 NOT NEW BUT NEVER EQUALLED

Standard Industrial has pioneered in most of the outstanding contributions to better wire drawing through better lubricants. Consult Standard Industrial for the solution of your difficult problems.

NO. 204TS BORAX COATED NAIL STOCK

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CHICAGO 44, ILLINOIS
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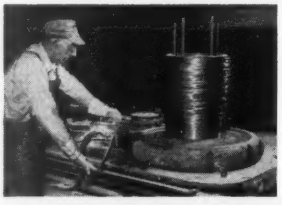
Start with the BEST

When you buy Silver Star you're starting with the best. From start to finish, it's engineered only for upholstery springs. It coils and knots beautifully, makes springs that are both lively and long-lasting. Whether you're producing low-priced box springs or luxurious innerspring mattresses, Silver Star will put quality into your product—and at no extra cost.

Let us ship you a trial order so that you can test it fully and compare it with the spring wire you've been using. Most of our present customers decided on Silver Star in just that way. Write us at Bethlehem, Pa., or at our nearest sales office.



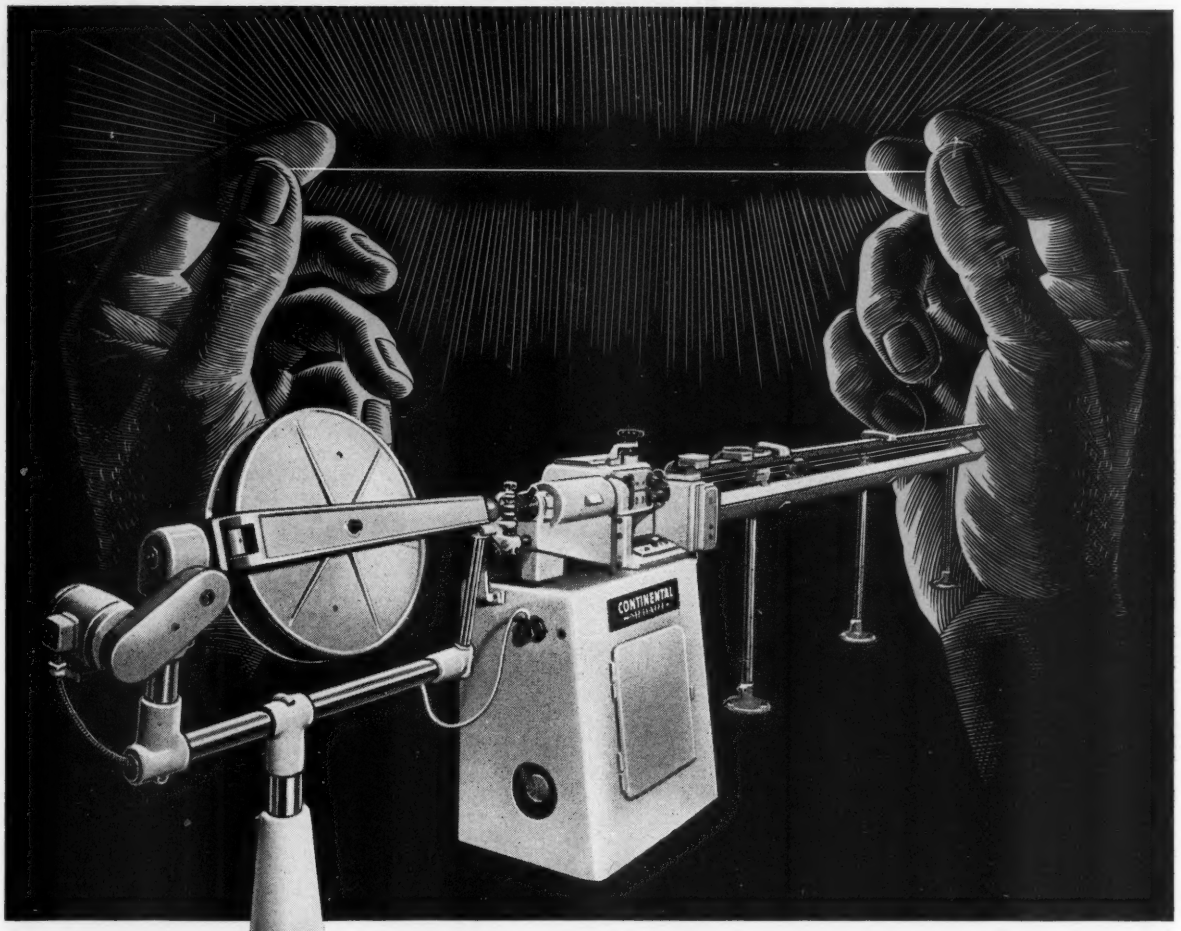
NO SHORT-CUTS TO TOP-QUALITY

There just aren't any easy short-cuts in the making of Silver Star. After we select the proper type of steel, its heat-treatment and other processing require many separate steps which have been developed in our modern wire mills. Each step calls for careful attention. The finished wire must be of the right size, with proper surface finish, temper, and have all of the other properties which are so essential in the high-speed production of upholstery springs.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL



Straight as a die—
fine as a human hair

The Continental-Medart *Minimatic* is the only machine of its kind designed especially to give high speed, precision straightening of fine round wire of from .007″ dia. to ⅛″ dia. without twist.

Key to *Minimatic's* process is a swinging spinner reel which moves laterally in an opposite direction to the rotating movement of the straightening dies. This pre-twisting compensates for die rotation and eliminates internal stresses in the straightened wire. The *Minimatic* is fully automatic and entirely self-feeding and is operated entirely by two push buttons.

If fine wire is included in your operations, write Continental-Medart for complete literature and information.

CONTINENTAL
MEDART
Minimatic
WIRE STRAIGHTENER AND CUT-OFF

HIGH-SPEED PRECISION STRAIGHTENING
OF FINE ROUND WIRE (.007" TO ⅛")

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Plants at
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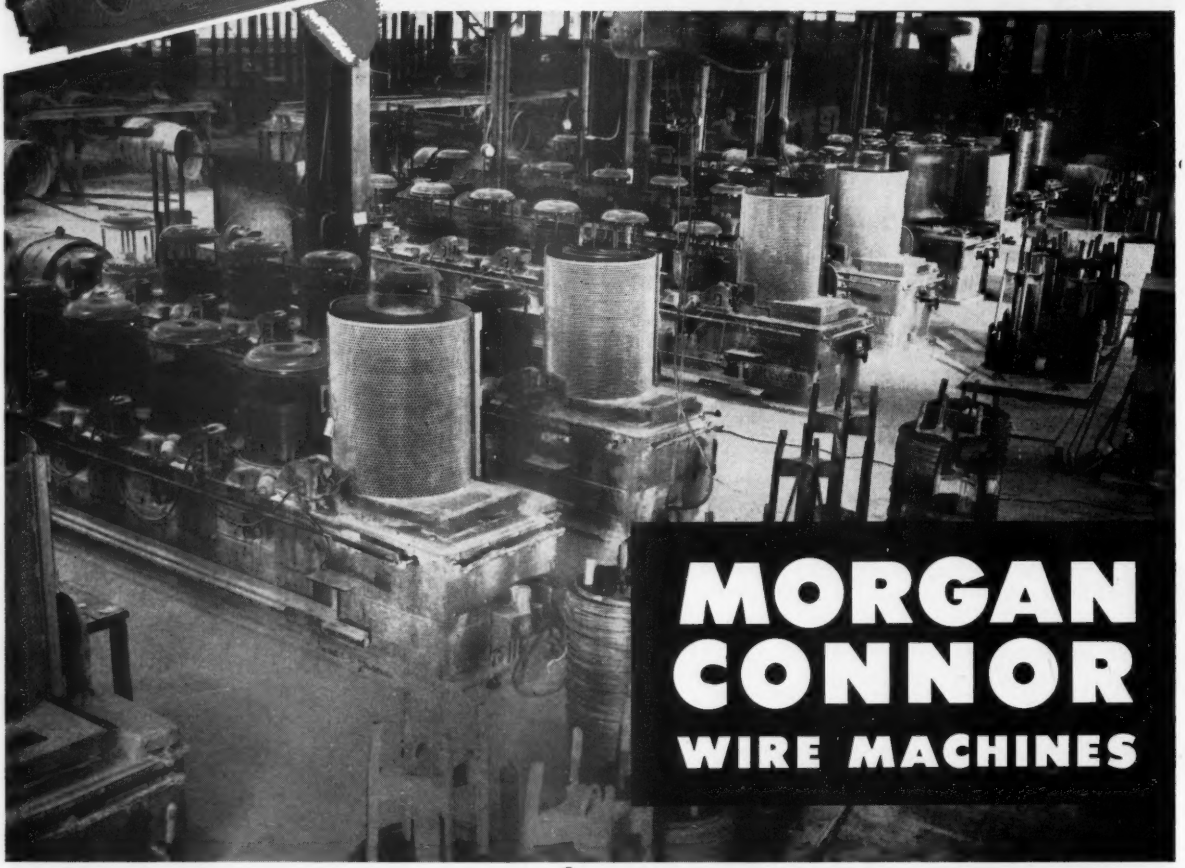
Laclede started with

Morgan Wire Drawing Machines

in 1934 . . .

for the past 20 years they have added MORGAN machines as needed for expansion.

Photo courtesy Laclede Steel Company



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CONNOR
WIRE MACHINES

MORGAN CONSTRUCTION CO.

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WM-30

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Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 30 February, 1955 No. 2

Designated as Official Publication By The Wire Association

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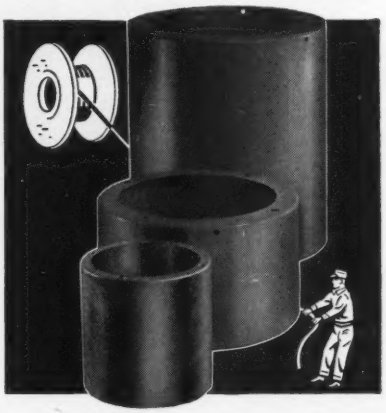

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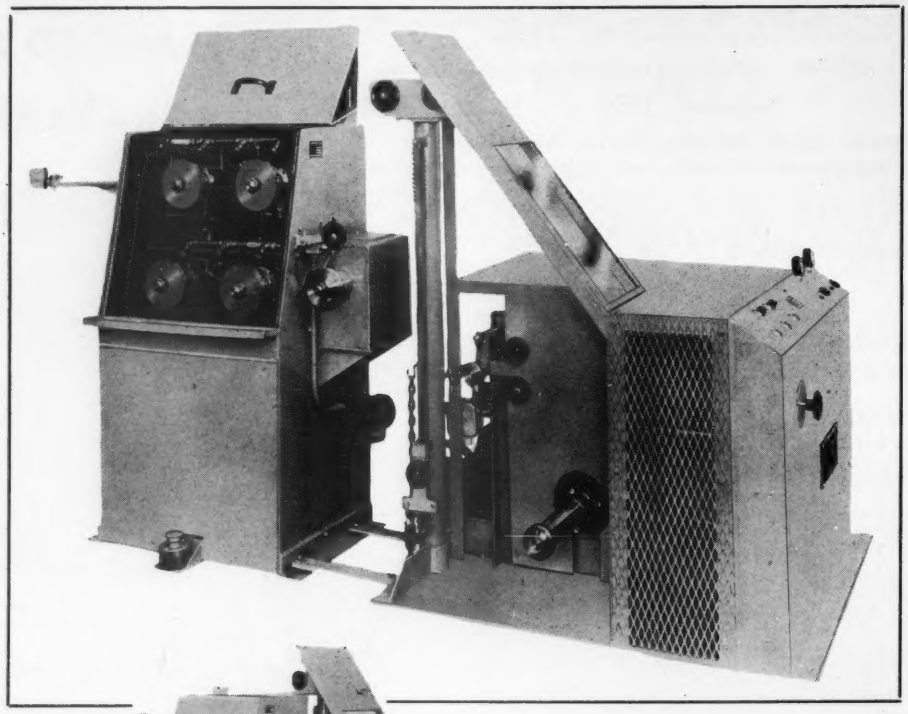
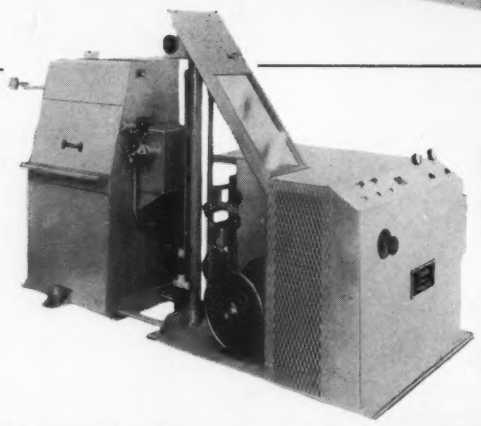
with New Spooler and Cook's Model F-31





IMPROVED MODEL F-31 FINE WIRE DRAWING MACHINE

designed for longer runs and greater operating ease . . .

LARGER TAKE-UP REEL CAPACITY → 330 lbs!

- Maximum Wire Entering Size . . . #14 B & S Gauge
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- Operating Speed . . . . . 5000 f.p.m.
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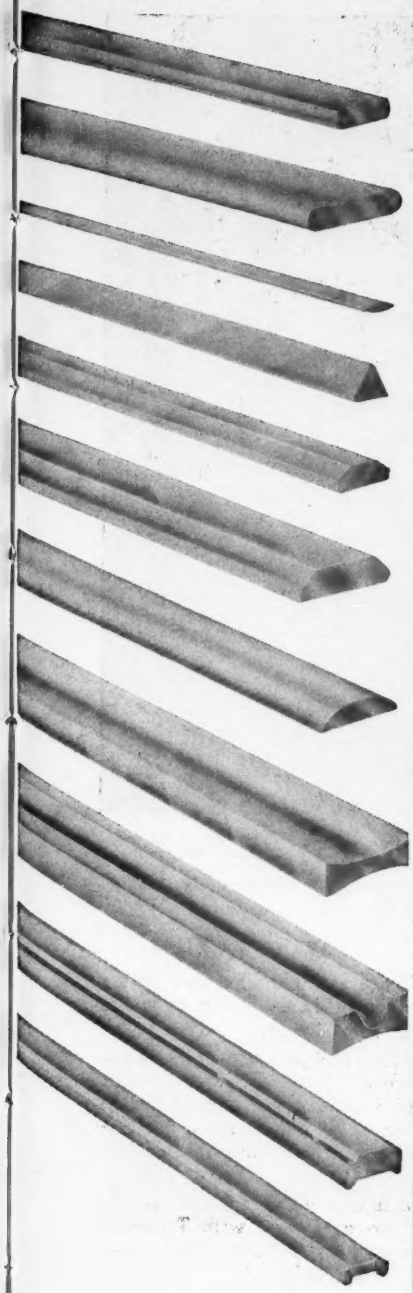
"Designers and Builders of Quality Machinery for The Wire Industry"



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in Coils or Straight Lengths

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Shaped Wire in Coils or Straight Lengths, Ferrous or Non-Ferrous.

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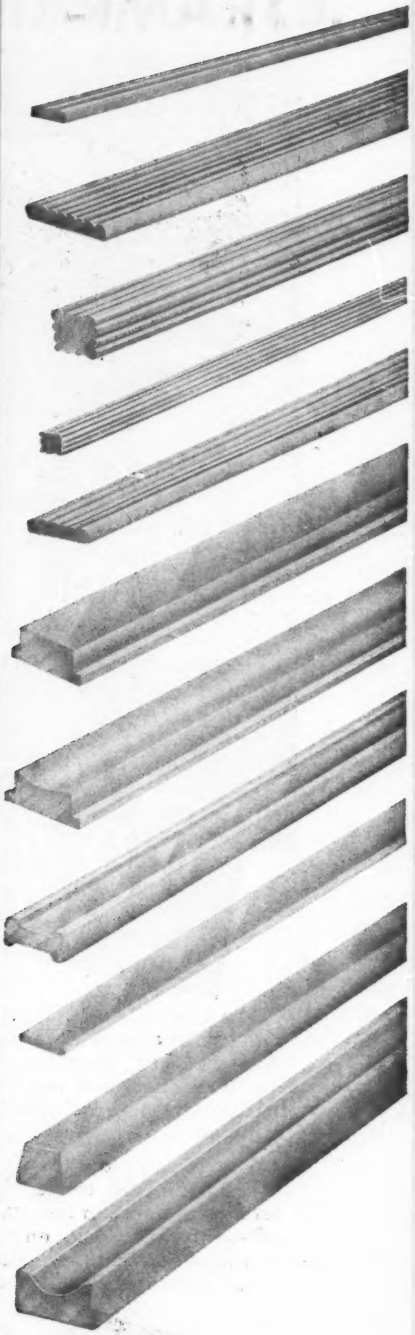

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PRECISION SHAPED WIRE DIVISION

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TRAMRAIL-EQUIPPED ROD STORAGE

CUTS HANDLING COSTS

This large structure was especially designed to accommodate a Cleveland Tramrail crane and hairpin-hook. It has enabled an impressive reduction in rod storage and handling costs. Size is 60'-0" x 160'-0". Crane runway is 200'-0" long. Height floor to roof truss is 35'-0". Storage capacity is 2500 tons.

The cost of storing and handling rod has been reduced to a very low figure at the Frost Steel and Wire Co., Ltd., Hamilton, Ont., with an open, roofless building which was built especially for the installation of a Cleveland Tramrail crane with hairpin-hook carrier.

The 160'-0" long structure is provided with unusual cantilever trusses for supporting the three archbeam tracks of the crane runway which extend 20'-0" beyond both ends of the building. These overhangs permit the crane to run over spur tracks of the Canadian Pacific Railroad at one end and the Canadian National Railway at the other end of the frame-work. Thus, rod can be lifted out of railroad cars and placed directly into storage.

On some days 8 cars of rod, or 400 tons, are brought in. The coils are piled eight high. At least double the amount of rod received must be handled, since the crane also has to move it out of storage. The work is taken care of completely by the operator in the crane cab.

The storage areas of many wire and rod plants, both large and small, are equipped with Tramrail systems for either horizontal or vertical coil storage.

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THE CLEVELAND CRANE & ENGINEERING CO.
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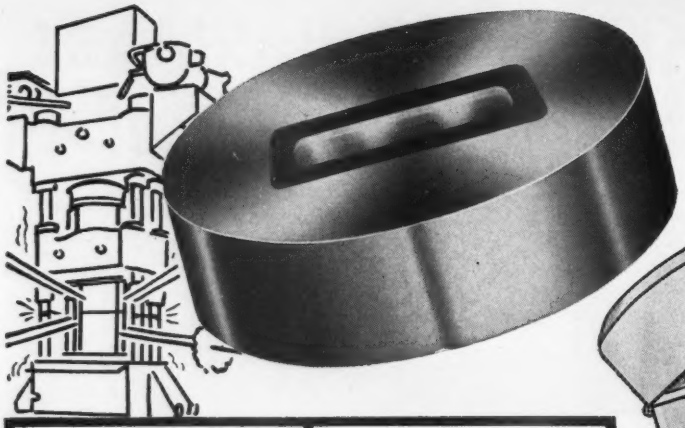
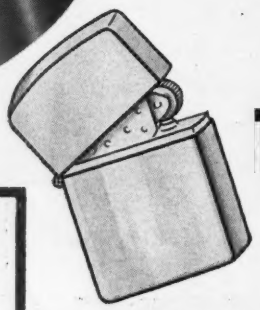


12,979,660 LIGHTER CASES WITH TALIDE DIES

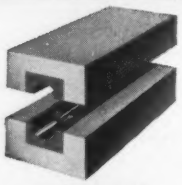


A leading producer of cigarette lighter cases was experiencing considerable trouble using steel dies. An excessive number of lighter cases were being scrapped due to tears and deformation. Die cost was running $.028 per lighter. Operation involves drawing .020" thick carbon steel on A-3 Niagara presses, 45 strokes per minute.

Our die engineers were called in, and after installing specially designed Talide dies on customer's press line, rejects were eliminated, as well as time previously spent in buffing and polishing the cases after drawing. Subsequent plating expense was reduced ⅓ due to the smoother surface on the cases drawn.

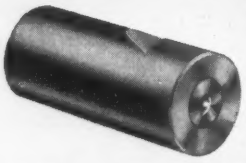
The original 15 Talide dies placed in production have now drawn a total of 12,979,660 cases for an average life of 865,310 per die. Previous steel dies produced an average of 15,000 cases per die. Die life was therefore increased 58-1 after the installation of Talide dies.

Die cost has now been reduced to $.0008 per lighter drawn, and customer estimates his saving for the past year, using Talide dies, has been at least $25,000.



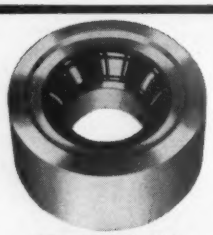
SWAGING DIES

Leading Fountain Pen Manufacturer cold swages 33 times more stainless steel parts with TALIDE dies.



HEADING AND EXTRUSION DIES

Cold-heading ¾" carriage bolts, TALIDE dies produced 1,500,000 pieces, steel dies only 50,000.

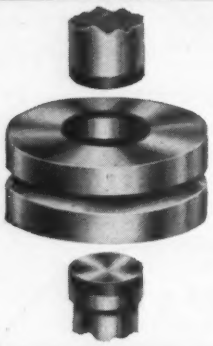


SHEET METAL DIES

137,000 hi-alloy steel Pressure Vessels drawn with TALIDE, against only 7,900 with steel dies previously used.

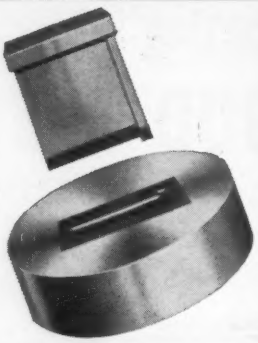
CURLING ROLLERS

TALIDE Curling Rolls last 65 times longer than steel rolls on beverage can forming operation.



POWDERED METALLURGY DIES

Pill dies of TALIDE metal outlast steel dies 100 to 1 while reducing rejects 82%.



BLANKING AND FORMING DIES

70 times more paper discs blanked out with TALIDE—over hard alloy die.

IMPROVED QUALITY

Additional refinements and improvements in our process have added still longer life to the wearing edges of Talide tools, dies and wear-resistant parts. The result is a carbide having a new, unique grain structure with harder and tougher properties than previous grades. Laboratory tests reveal our improved grades possess 25% greater strength and rigidity. Service life per grind up to 50% longer than previous grades has been proven in grueling field tests.

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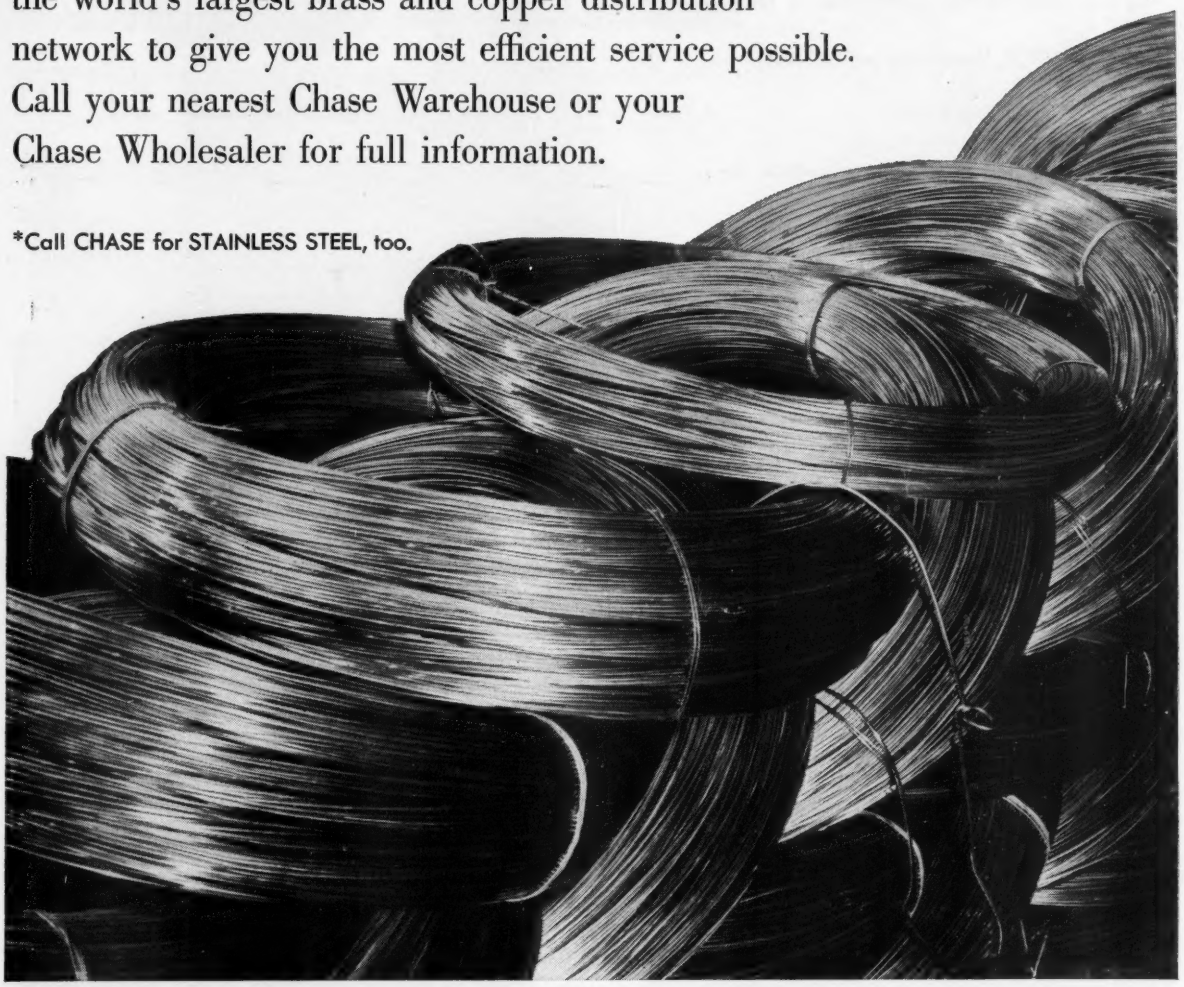
*Call CHASE for STAINLESS STEEL, too.



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Fastest Process Annealing FOR COILED STEEL WIRE

- ✓ Annealing cycles accomplished in minutes rather than in hours
- ✓ 50% lower equipment cost
- ✓ less floor space
- ✓ no scale, decarburization, or other atmosphere effects

On-the-job production figures prove that no other method compares with an Ajax Electric Salt Bath Furnace in speed, uniformity, cost saving, and general all-around efficiency in process annealing all types of steel wire as well as aluminum, copper alloys, and silver alloys.

Heating cycles are far faster. Absolute uniformity is assured. Thanks to the exclusive Ajax electrodynamic stirring action, the temperature does not vary more than ±5°F. *in any part of the bath.*

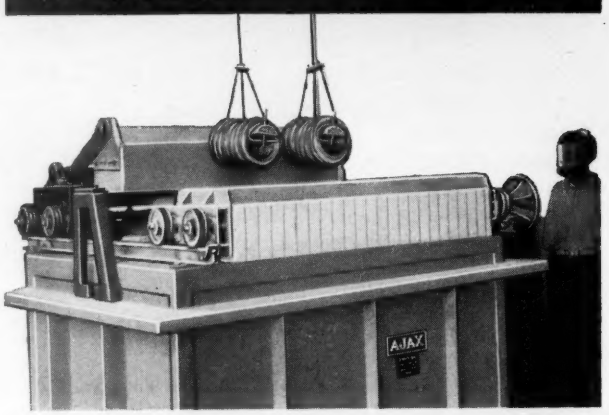
The Ajax Salt Bath eliminates all atmosphere with its accompanying problems of oxidation, pitting, and decarburization. Preservation of metal surface is assured. Equipment cost is much lower —and the Ajax handles more work for a given amount of floor space than any other method. Ajax Reprints 62 and 63 gladly sent on request.

LOW- AND HIGH-CARBON STEELS

This typical Ajax installation process anneals 1200 lb. 18-gauge wire an hour in only 58 feet of floor space.

STAINLESS STEEL

Annealing fine gauge nickel-chromium wire at 1950°F. Clean wire surface eliminates conventional pickling operations.



- **TOPS for WIRE PATENTING, too!**
- **IDEAL FOR DESCALING** hot-rolled stainless and alloy steel wire and other shapes employing either the Dupont sodium hydride or the Hooker Electrochemical Virgo bath.

Associate companies: Ajax Electric Furnace Corp. • Ajax Engineering Corp. • Ajax Electrothermic Corp.

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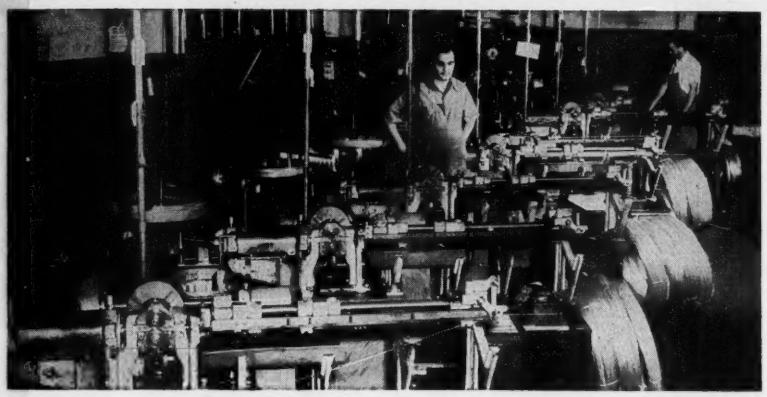
AJAX electric SALT BATH furnaces

OVER 4,000 INSTALLATIONS . . . more than all other salt baths combined

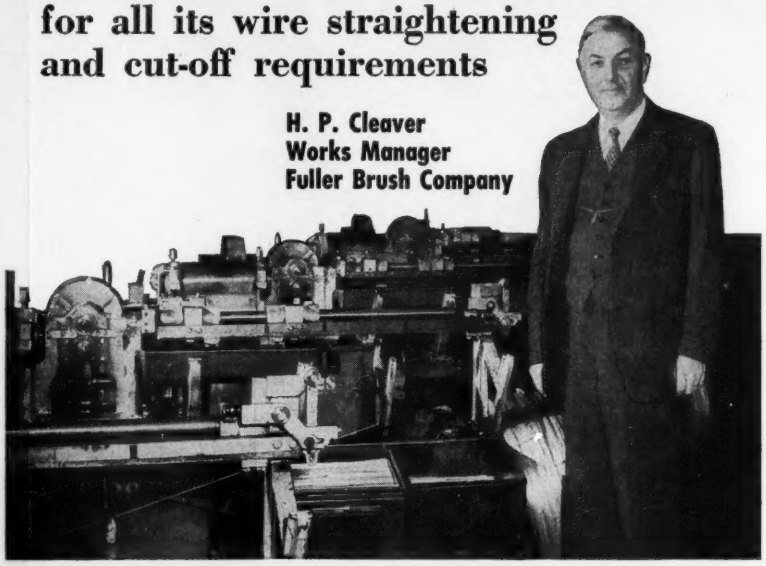
AJAX ELECTRIC CO., Inc., 928 Frankford Ave., Philadelphia 23, Pa.



FULLER DEPENDS ON SHUSTER....

for all its wire straightening and cut-off requirements

H. P. Cleaver
Works Manager
Fuller Brush Company



Every Fuller twisted-in-wire brush, famous throughout the world, is produced with wire straightened and cut to length by Shuster Wire Straightening and Cut-off Machines!

Fuller has been using Shuster machines for many years; since 1948 a battery of seven Shusters have been in full production, often on double shifts, dependably straightening and accurately cutting wire for the special Fuller-designed Brush Twisting Machines. The Fuller people have found their Shusters to be highly dependable servants, sturdy, accurate and extremely economical.

Shusters are available for .025" to 11/16" diameter wire; shapes, flat stock, tubing. Write us your requirements.

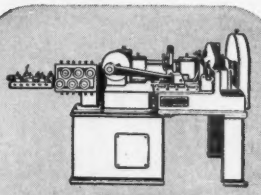
SHUSTER
SINCE 1866

METTLER MACHINE TOOL INC.

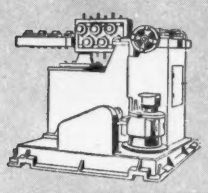
155 W. Adeline Street New Haven, Conn.

New York Office: 11 Broadway, New York, N. Y., Whitehall 4-5480

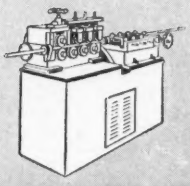
80 YEARS
SHUSTER
AMERICA'S OLDEST NAME IN WIRE STRAIGHTENING & CUTTING



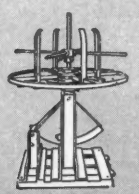
SLIDE FEED STRAIGHTENERS
3/8" x 10"; 9/16" x 10"



FEED STARTER AND STRAIGHTENER
Max. 5/8" dia.



TUBE AND BAR STRAIGHTENER
7/32" to 5/8" bar 1" tubing



REELS
400 lbs.

Gentlemen:

Please send us your recommendations. Our straightening and cut-off requirements are as follows:

.....

.....

Name .....

Firm .....

Street .....

City ..... Zone ..... State.....

You can sell the difference

SCOVILL EXTRUDED COLD-HEADING WIRE (Cartridge Brass, 70%)

. . . because of its higher copper content and production by the Hot Extrusion process from uniformly sound Continuous-Cast billets . . . virtually eliminates defects (when attributed to wire) such as split heads or shanks . . . "out of round" heads . . . inadequate filling out of heads and shoulders . . . and rough "orange peel" effect. These are differences in quality you can SELL in your cold-headed products.

Let us help you specify the proper closely controlled Scovill temper to produce more nearly perfect headed parts . . . whether you require "flow" characteristics for heading, or "flow" plus essential rigidity for secondary machining.

Scovill Manufacturing Company, Mill Products Division,
99 Mill Street, Waterbury 20, Connecticut. Phone Plaza 4-1171.

SCOVILL MILL PRODUCTS

BRASS • BRONZE • NICKEL SILVER • ALUMINUM

165C55

Youngstown

QUALITY YOUNGSTOWN SERVICE

BRIGHT BASIC WIRE

●These coils of Youngstown Bright Basic Wire will soon go to make a thousand and one different shapes. As U bolts, eye bolts, special-shaped rods and handles, Youngstown Wire is formed, crimped, threaded and headed to give you perfect wire products consistently. Make your next wire order Youngstown—the wire from which can be formed many perfect shapes.

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices: Youngstown, Ohio - District Sales Offices in Principal Cities

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES

TESTS DEMONSTRATE EFFECTIVENESS OF...

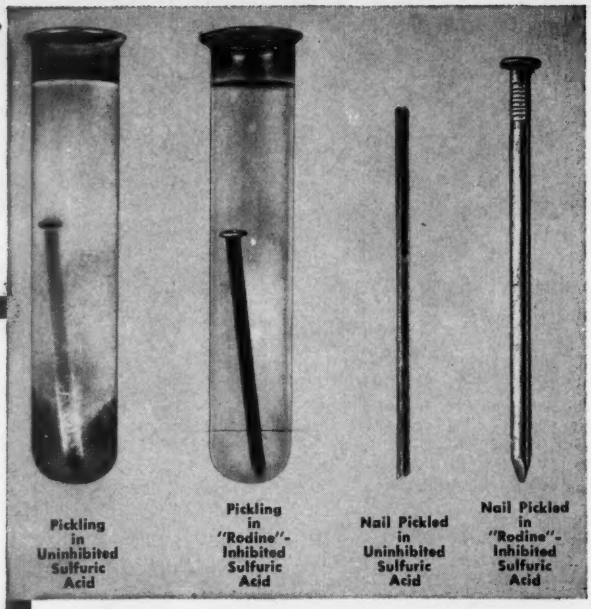
Trade Mark

RODINE

Reg. U.S. Pat. Off.

PICKLING ACID INHIBITOR

"Rodine" more than pays for itself in savings of acid and metal. More uniform pickling and better pickled surfaces are obtained when "Rodine" is used in acid pickling baths.

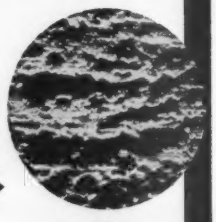

Pickling in Uninhibited Sulfuric Acid
Pickling in "Rodine"-Inhibited Sulfuric Acid
Nail Pickled in Uninhibited Sulfuric Acid
Nail Pickled in "Rodine"-Inhibited Sulfuric Acid

The photographs above illustrate the beneficial effect produced by a small amount of "Rodine" in a pickle bath.

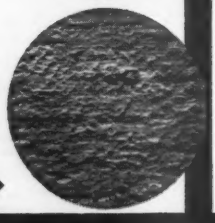
A. Both test tubes contain a 10 per cent by volume solution of sulfuric acid. In the left-hand tube, no further additions have been made to the acid. Notice the gas bubbling off the nail. This is hydrogen, caused by the action of acid on good metal. In the right-hand tube, "Rodine" has been added in an amount equal to 1 per cent by volume of the concentrated acid. Notice the absence of bubbling in this tube. "Rodine" prevents the formation of hydrogen that results from dissolving metal.

B. Both nails after being pickled for the same time. The nail pickled with "Rodine" has lost little weight and has retained its original luster and appearance. The nail pickled without "Rodine" is no longer a nail. "Rodine" prevents the acid from dissolving metal.

This steel surface was pickled in an uninhibited acid bath. Note the deep pits, and that the surface is visibly crystalline.



This surface was pickled exactly like the one above except that "RODINE" was added to the acid solution. Only scale pockets and roll marks are visible; no pitting occurred.

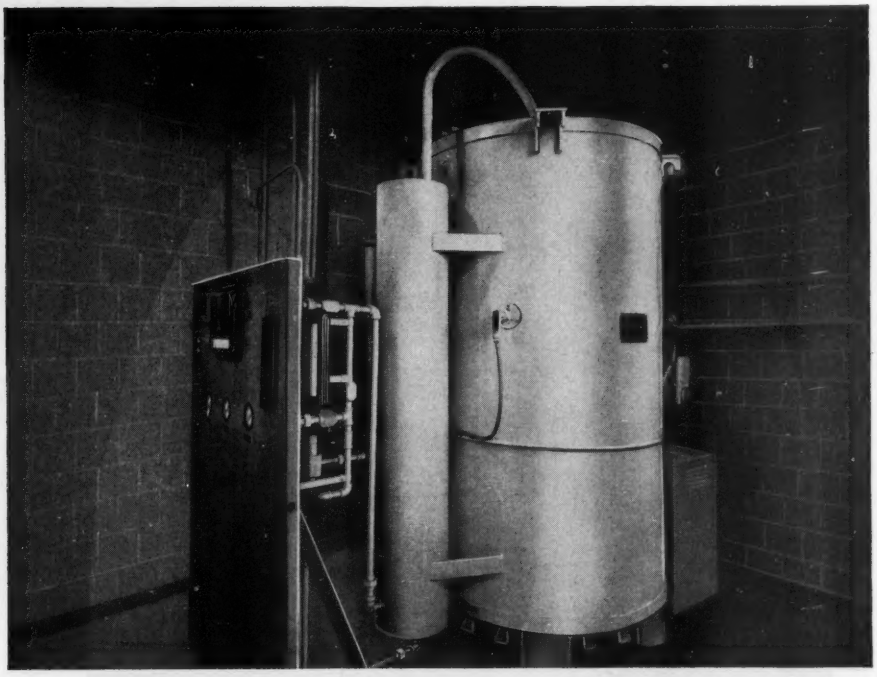


CHEMICALS ACP PROCESSES

AMERICAN CHEMICAL PAINT COMPANY

General Offices: Ambler, Penna.

Detroit, Michigan — Niles, California — Windsor, Ontario



"Cracked" Ammonia shows tremendous cost saving and unsurpassed performance

1 —Bright Annealing—Stainless Steels, Nickel and Nickel Alloys, Beryllium Copper, Silicon Copper Alloys and Bronzes, and high and low carbon steels.

2 —Clean Hardening—High carbon and high chrome tool steels.

3 —Copper Brazing of all types of ferrous metals.

4 —Sintering of Powdered Metal Parts.

5 —Bright Annealing of Electrical Steels.

6 —Reduction of Metal Oxides.

7 —Atomic Hydrogen Welding.

8 —Radio Tube Sealing.

the Drever

Ammonia

Dissociator

produces the ideal protective furnace atmosphere

DREVER COMPANY

We can supply COMPLETE STORAGE SYSTEMS for tank car lots of anhydrous ammonia. This reduces the cost of ammonia approximately 75%. *Write for bulletin B-52*

RED LION RD. & PHILMONT AVE. • BETHAYRES, PA.

by **SYNTHETIC**

Synthetic yarns of Viscose Rayon, Acetate Rayon, High Tenacity Cordura, Nylon, Dacron, Orlon and Fortisan, together with Purified Cotton (manufactured under Western Electric License), furnished you on Single or Multiple Wound Braider or Serving Tubes, in Standard packages.

Special Twisting, featuring knotless packages, is also done. We can supply all yarns in constructions and in packages to meet your exact specifications.

Cotton yarns in all sizes.

DYED YARNS ARE OUR SPECIALTY

Synthetic and cotton yarns treated for electrical applications.

WAXED LACING CORDS CORE YARNS

In fact, any yarn requirement for electrical insulation is either carried in stock or can be processed for you in our up-to-the-minute manufacturing facilities.

Write today for information.

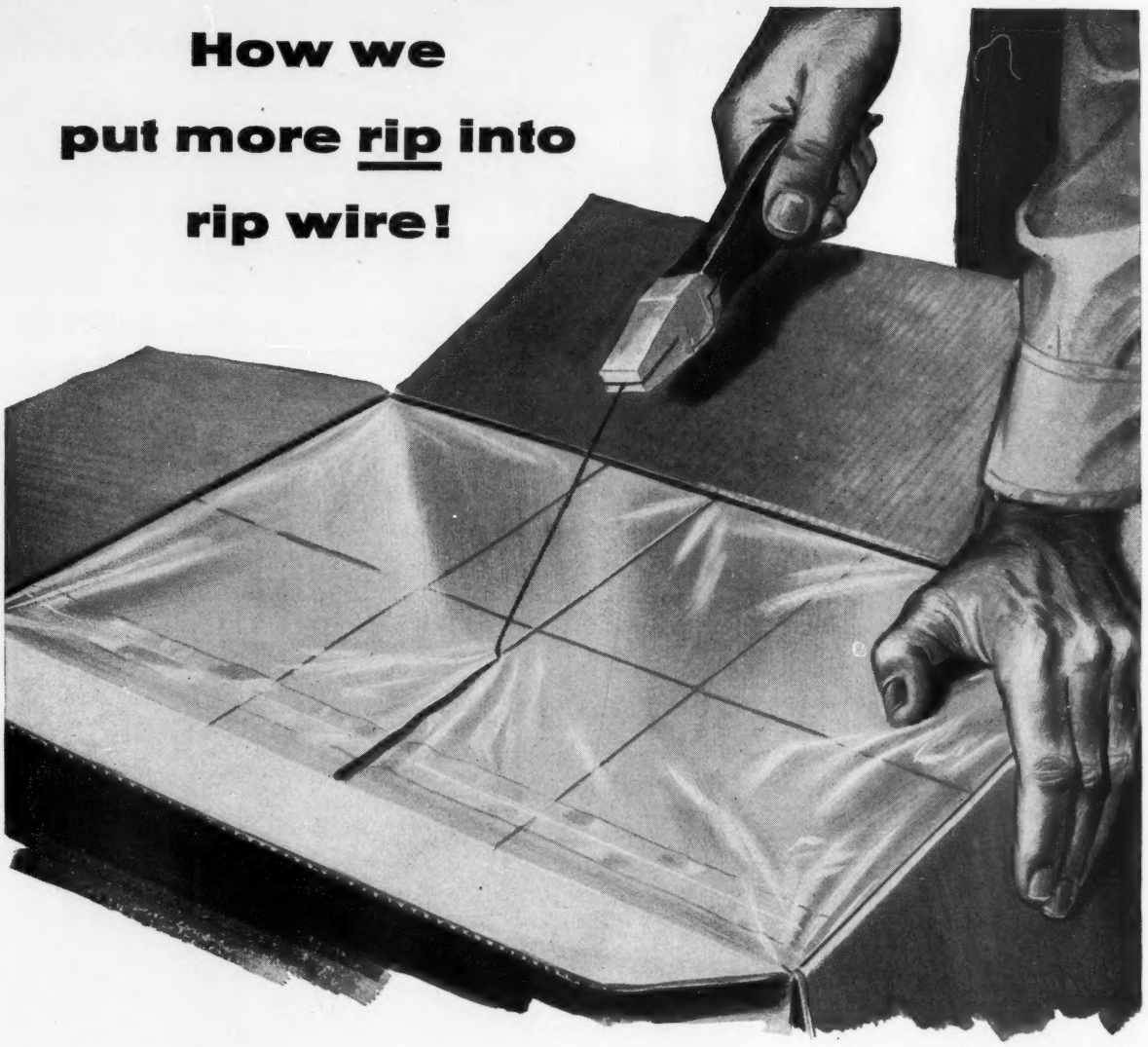
SYNTHETIC THREAD CORP.

238 W. GOEPP ST., BETHLEHEM, PA.

Bethlehem Telephone
UNiversity 8-8575

New York Telephone
STerling 8-5700

How we put more rip into rip wire!



● Industry often wraps its products in heavy paper to protect it from damage due to moisture, handling and other causes. To make these packages or bundles easier to open, *Worcester Wire Works* has developed a special rip wire for inclusion in the wrapping.

To get even greater protection, some products are wrapped in plastics rather than paper. And this caused a problem. Ordinary rip wire wouldn't cut the tough plastic.

Our *Worcester Wire Works Division* solved the problem by developing a special rip wire with a knurled surface that literally put teeth into the wire. It cuts through the toughest plastic coating as easily as a buzz saw.

Not all of the problems we solve for industry have such simple solutions. Often, we are called upon to develop steel and wire with completely new characteristics . . . to combine seemingly incompatible factors or properties. And quite frequently these are developments that other manufacturers have given up on.

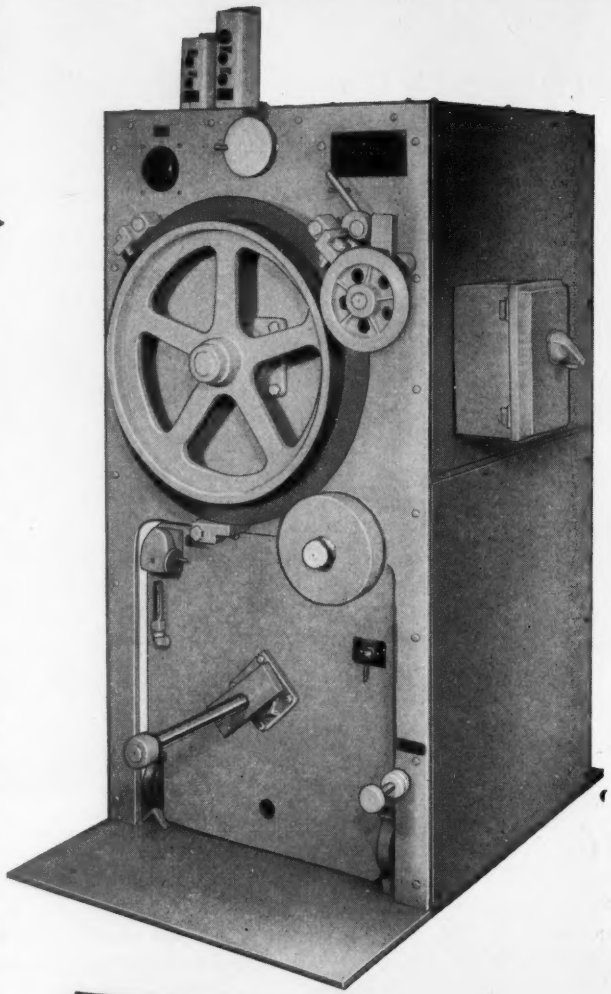
If you have a problem calling for special development work in steel or wire . . . either in creating a product or finding new and better ways to make or use it . . . it will pay you to write or call National-Standard.

NS
NATIONAL-STANDARD Company
NILES, MICHIGAN

NATIONAL-STANDARD COMPANY • NILES, MICHIGAN
Tire Wire, Stainless, Fabricated Braids and Tape
ATHENIA STEEL DIVISION • CLIFTON, N. J.
Flat, High Carbon, Cold Rolled Spring Steel
REYNOLDS WIRE DIVISION • DIXON, ILLINOIS
Industrial Wire Cloth
WAGNER LITHO MACHINERY DIVISION • JERSEY CITY, N. J.
Special Machinery for Metal Decorating
WORCESTER WIRE WORKS DIVISION • WORCESTER, MASS.
Round and Shaped Steel Wire, Small Sizes

HEAVY DUTY ENAMEL WIRE TAKE-UP

for heavy rectangular and round magnet wire



OUTSTANDING FEATURES—Accurate, uniform wire speed without chattering. Stationary traverse sheave is adjustable for wire width and has an axial adjustment for positioning the wire with respect to the reel.

DESCRIPTION — The fabricated steel frame encloses the drive mechanism and is mounted on a steel bed plate.

The Capstan is Meehanite, with the outer surface polished. The wire is moved axially by means of a fleeter ring with adjustment for the fleeting angle. This type of construction gives accurate wire speed without chattering. The Capstan is driven through a worm and gear to produce uniform wire movement. A rubber covered pressure roll is used to hold the wire in contact with the Capstan to prevent slippage during reel change.

The controls are mounted on the front of the machine, permitting the machines to be installed close together. The controls consist of a speed controller and indicator for the Capstan, a Variac for tension control, and a trimmer for fine traverse length adjustment.

. . . For further information ask for Cat. Sec. 3G

JAMES L. ENTWISTLE CO.

PLANT and EXECUTIVE OFFICE:

1475 ELMWOOD AVE., CRANSTON (PROV. 7), R.I., U.S.A.

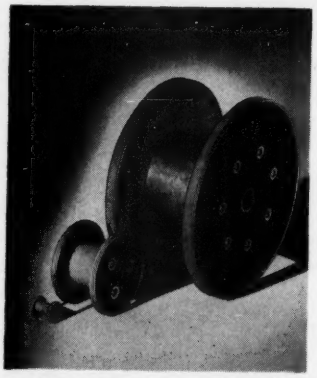
Whatever Your Requirements, Direct Your Inquiries to

HUBBARD—SPOOL and REEL HEADQUARTERS

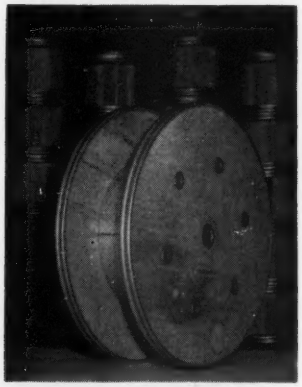
• ONE DEPENDABLE SOURCE FOR ALL TYPES •

SHIPPING • SHOP • STEEL • ALUMINUM • WOOD • PLYWOOD • SPECIAL

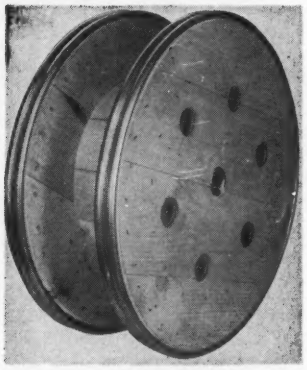
TRAVERSES • FLANGES • CAST • ARBOR PLATES • WASHERS • LAGGING



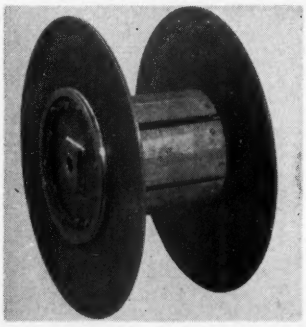
Plywood—Process and Returnable Shipping Reels.



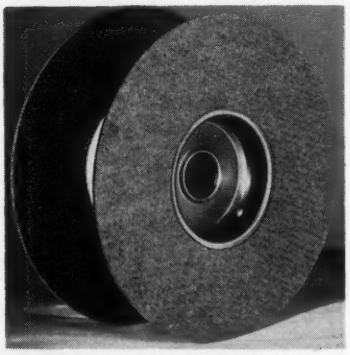
Dimension Lumber for Returnable Reels.



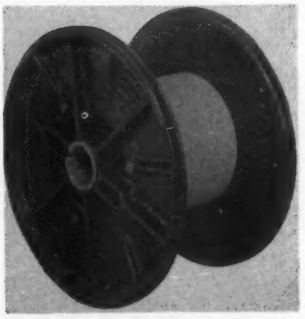
Nailed Reel. Banded for Returnable Types.



Special Reels Made to Your Designs



Reel with masonite flange and cardboard hub assembled with steel end washers for domestic or export shipment of wire, tape, braid or other materials.



Light Alloy Cast Reels for Process & Shipping

The HUBBARD LINE of Spools and Reels includes all types and combinations of constructions for shipping, shop and processing for wire, rope and electric wire and cable, standard or made to your specifications.

We invite your inquiries.

HUBBARD SPOOL COMPANY

GARRETT • INDIANA

Telephone: 840

"THE BIGGEST NAME IN SPOOLS AND REELS"

Story of a contractor who lost his shirt

(or why use ELGIN Diamond)

Once upon a time there was a contractor. He was a good contractor. He worked hard, knew his business, did all the things that help pile up the bucks. This contractor built houses, hotels, highways, anything . . . and that meant concrete. Why, he used so much concrete it just wasn't funny.

One day, a salesman from a new kind of company called on our contractor and tried to sell him "ready-mixed" concrete.. "Ready-mixed" concrete . . . now wasn't that a silly thing? Why, he'd been mixing his own concrete for nigh onto 20 years. Why change now? "Ready-mixed" . . . ridiculous.

Well, as it happened, the same salesman called on some of Mr. Contractor's competitors and they thought "ready-mixed" concrete was great, tremendous, terrific. They found there was no waste, it was convenient and even saved them money. It wasn't long before friend contractor lost his shirt. Sad? Yes . . . if only he had *tried* "ready-mixed".

Today, there's a "ready-mixed" type of diamond abrasive on the market called Elgin Diamond. Lots of companies use it—some don't. Those that do have found that with Elgin Diamond there's no bothersome mixing or special grading, no costly waste or chance for error. They also found that because diamond particles are permanently suspended in a specially formulated, color-identified vehicle, they get consistent polishing results.

We're not saying you'll lose your shirt if you don't use Elgin Diamond. We are saying you owe it to yourself and your company to try Elgin Diamond. You can get all the facts by writing.

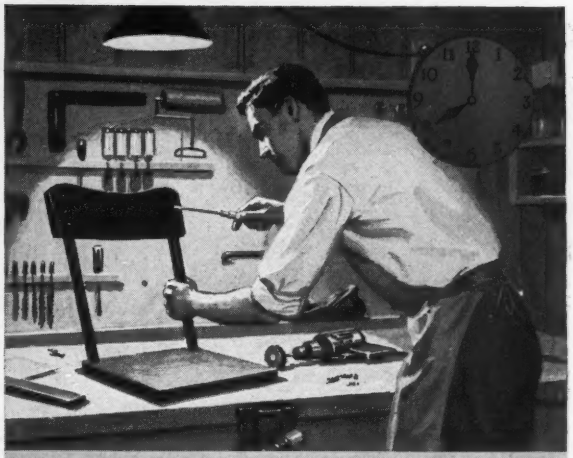
ABRASIVES DIVISION

Dept. G

ELGIN NATIONAL WATCH COMPANY

ELGIN, ILLINOIS

6:00 P.M.—HOME. This is John's house, of which he is justly proud. Note that a sturdy chain link fence protects his privacy and property. On his windows you'll find insect wire screening. Springs on his doors. TV Guy Wire on the roof. Flower bed borders in his garden.



8:00 P.M.—WORKSHOP. John is a "do-it-yourself" man. This is his workshop. He probably doesn't realize it but the screw driver he's using is made from wire. The wire brush on his buffing wheel and the handle on the paint roller, too. And, of course, indispensable nails and screws.

round the clock with

CF&I-WICKWIRE WIRE

9:30 P.M.—LIVING ROOM. Here, we see John relaxing in the comfort of his living room, where wire is used in many forms. Upholstery springs in his furniture. Wire in his TV set. Lampshade wire and picture cord wire. Even the screen in front of his fireplace is made of wire.

In our previous advertisements we have highlighted the importance of CF&I-Wickwire Wire in the daily life of John Q. Citizen. Here, at the end of a busy day, we find him returning home.

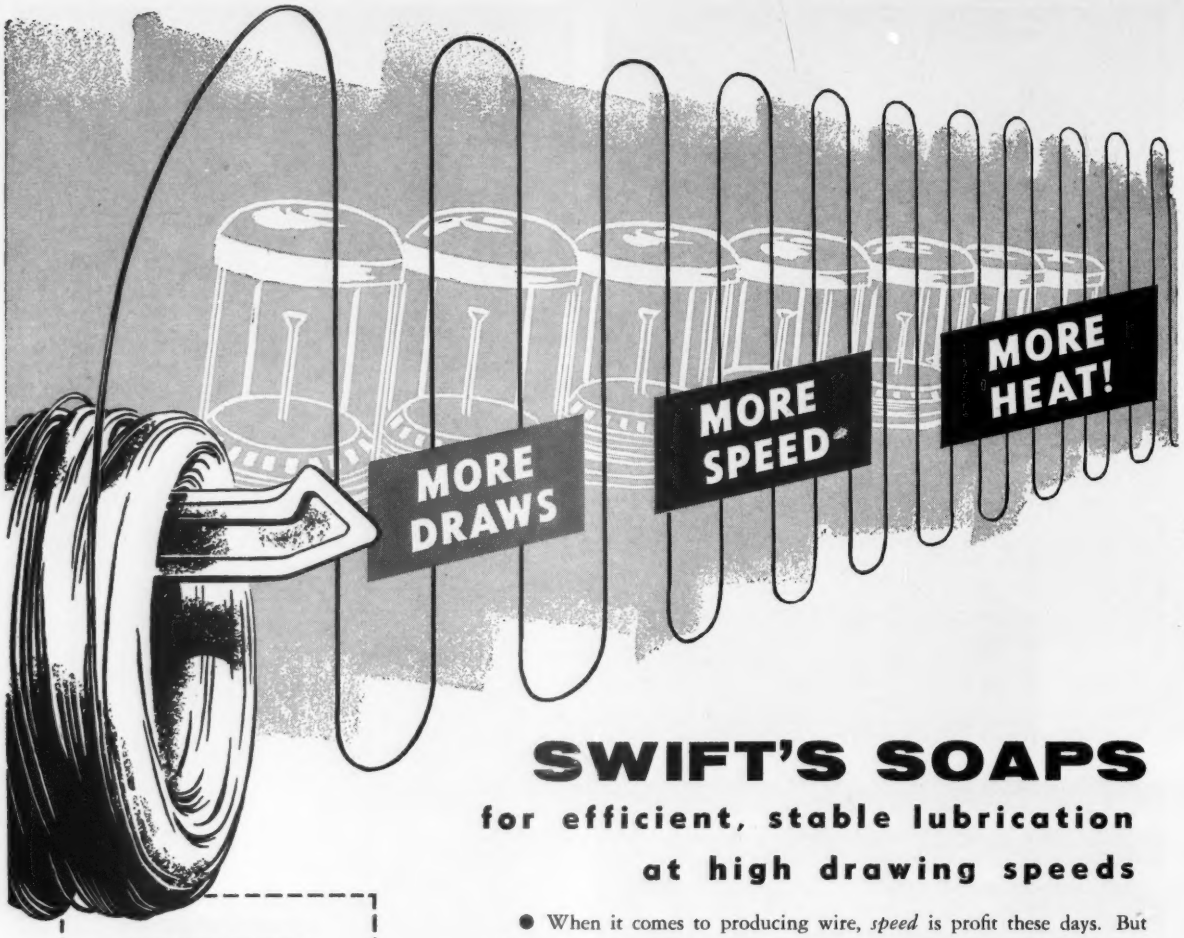
For the Wire You Require—
Check CF&I-Wickwire

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia
THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso • Ft. Worth • Houston
Lincoln (Neb.) • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • Seattle • Spokane • Wichita

2737



SWIFT'S SOAPS

for efficient, stable lubrication at high drawing speeds

IMMEDIATE DELIVERY ON THESE QUALITY SOAPS . . .

- **Powdered White Ribbon**
- **Guaranteed Powder**
- **Snap Heavy Duty Wire (Drawing Powder No. 282)**
- **No. 559 Powdered Soap**

● When it comes to producing wire, *speed* is profit these days. But higher operating speeds, more draws and shorter cooling time between draws mean *heat* too . . . heat that can cut into profits by reducing wear life and the general efficiency of dies and other metal operating components.

That's why the importance of the quality and overall stability of your drawing lubricant *increases* with the speed of your operation—why a dependable lubricant can help you make the *most* of higher, more efficient operating speeds by resisting breakdown under high heat and friction. Swift's wire drawing lubricants are stable because they are produced from the finest raw materials available. They are dependable and efficient because they are produced to uncompromising standards of quality . . . standards established through constant attention to the specific needs of our many customers.

Why not depend on Swift's as a single source for *resourceful* service on a complete line of soaps for wire drawing? . . . 375 distributors throughout the U.S. and Canada can provide prompt delivery, courteous attention to your needs. Write for details and remember . . .

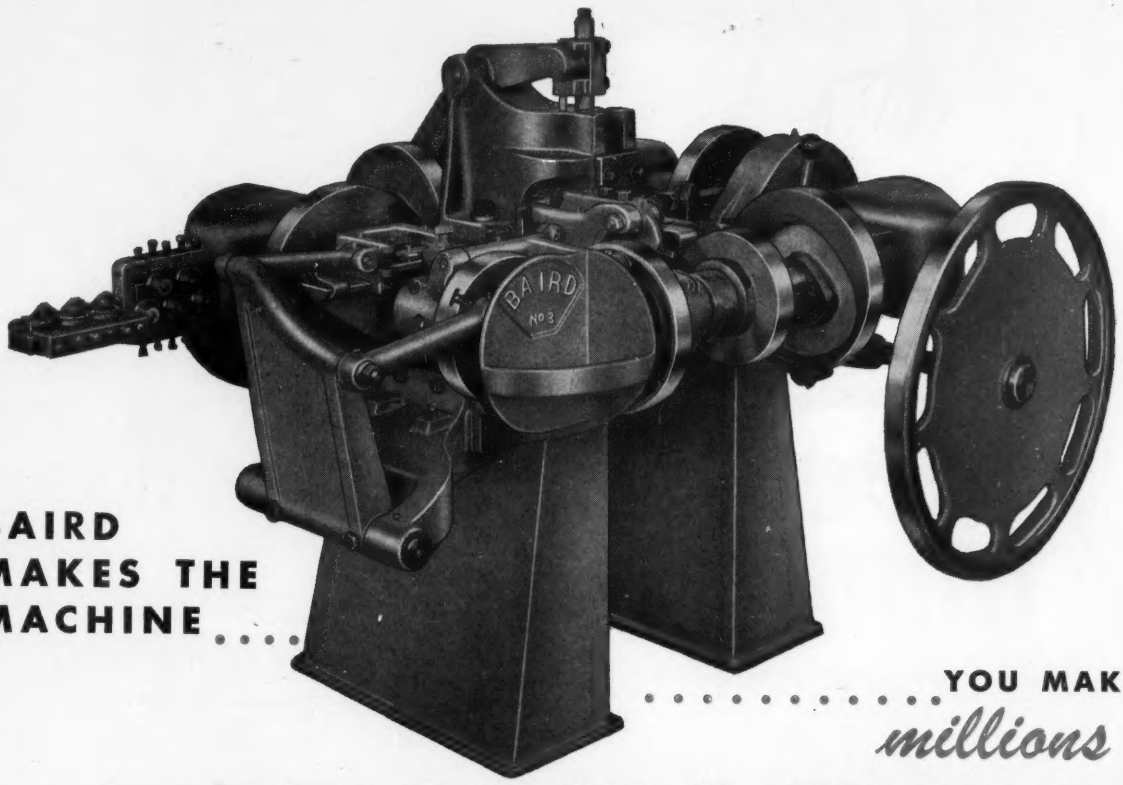
ONE TRIAL IS BETTER THAN A THOUSAND CLAIMS

Swift
1855 CENTENNIAL 1955
TO SERVE INDUSTRY BETTER

SWIFT & COMPANY
Soap Department
CHICAGO 9, ILLINOIS

ASK BAIRD ABOUT IT!

HIGH PRODUCTION TOOLING



BAIRD MAKES THE MACHINE . . . . . YOU MAKE *millions*

. . . OF ACCURATELY FORMED WIRE AND RIBBON METAL PARTS

The Baird automatic Four-Slide Machine produces an extremely wide variety of articles made of any commercial wire . . . round, half-round, square, or flat . . . at highest speeds. It takes coiled wire from a reel, straightens, feeds, and cuts off the required length . . . then forms and ejects the part produced. Eight sizes handle shorter wire lengths; three sizes take longer lengths to 32½".

By means of special attachments, the versatility of the machine is further extended to include the making of round wire and ribbon metal rings, secondary cut-offs, lettering, and other operations.

The detailed and complete story, with specifications, is told in our new Four-Slide Bulletin. If you require hundreds of thousands or millions of wire units to ½" dia., or flat ribbon metal products to 1½" wide . . . this is your profit-making machine. Send for bulletin. Write Dept. W P.

3BA53

the BAIRD MACHINE COMPANY
STRATFORD • CONNECTICUT

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

It can't be done

WE'VE DONE IT!

DURPON*

WIRE-DRAWING COMPOUNDS

last twice as long... yet cost no more!

We realize we're claiming a lot for Nopco Durpons. Perhaps the only men who believe it are the men who use Durpons. But they are the ones that matter.

There are two sound reasons for Durpon's profitable performance: All Durpon compounds contain: (1) a buffer, to maintain the pH level, keep the emulsion from breaking; (2) a sequestering agent, which holds the metal particles away from the effective drawing ingredients, *keeps the bath clean.*

Won't you be the next to try these high-performance compounds, and learn first-hand the economies they bring? Write today for technical bulletin and free working sample.

Nopco Chemical Co.,
336 Industrial St., Harrison, N. J.

"Stay Stable Longer"

DURPON—for intermediate gauge wire
DURPON L—for heavy wire, rods, and tubes
DURPON FW—for fine wire

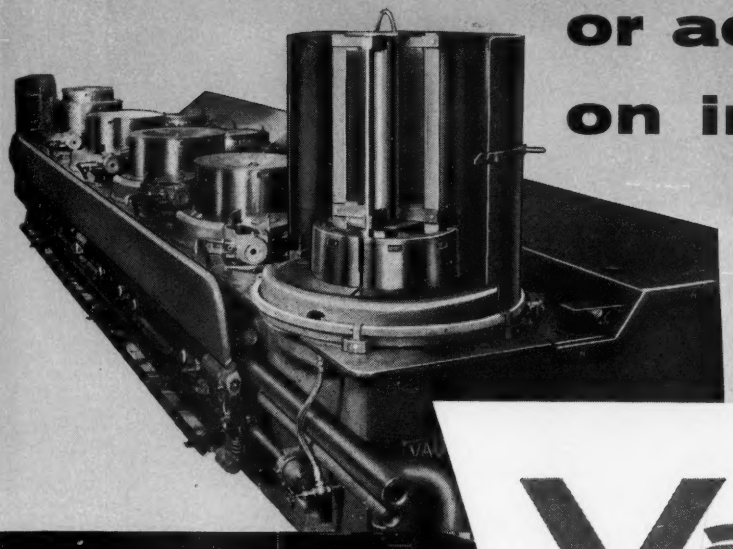
NOPCO

*Reg. U.S. Pat. Off.

PLANTS: Harrison, N. J. • Cedartown, Ga. • Richmond, Calif.

NO SLIP

or accumulation on intermediate blocks with



Vaughn®
MOTOBLOX®

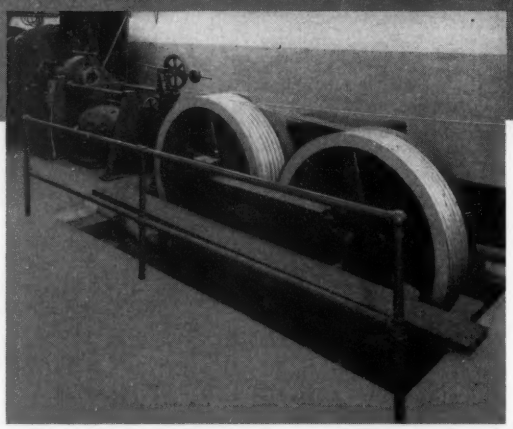
Slip is eliminated on Vaughn Motoblox machines because the speed of each block is automatically and precisely controlled to meet the pre-set speed of the finishing block. Wire does not accumulate on the intermediate blocks — operation is truly continuous. ● The Motoblox facts can profit you: let us present them!

THE VAUGHN MACHINERY CO.
Cuyahoga Falls, Ohio, U.S.A.

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

V®

"Quick on the Draw!"



60" multi-groove capstans tilted for straight pull on cable without chafing. Both capstans are driven.

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This machine has a capacity up to 37 wires and is supplied with 6, 12, and 18-reel heads. Any combination of spool heads can be supplied. Reels 22" diameter x 11" traverse are accommodated. Each head can be run independently in either direction or all heads can be run in unison in either direction at speeds up to 100 rpm. A speed of 120 rpm can be maintained on the 6-reel head.

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CABLERS · TAKE-UPS
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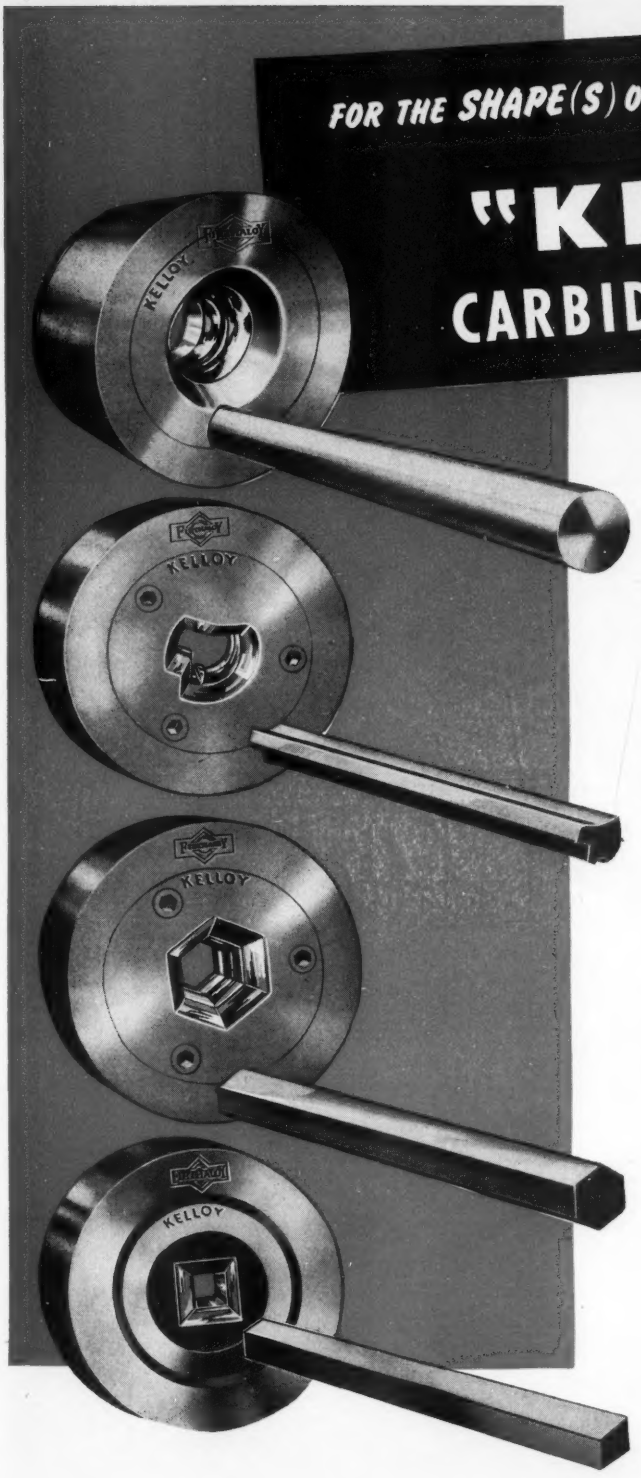

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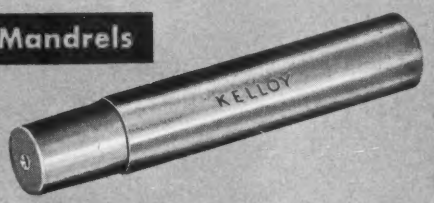

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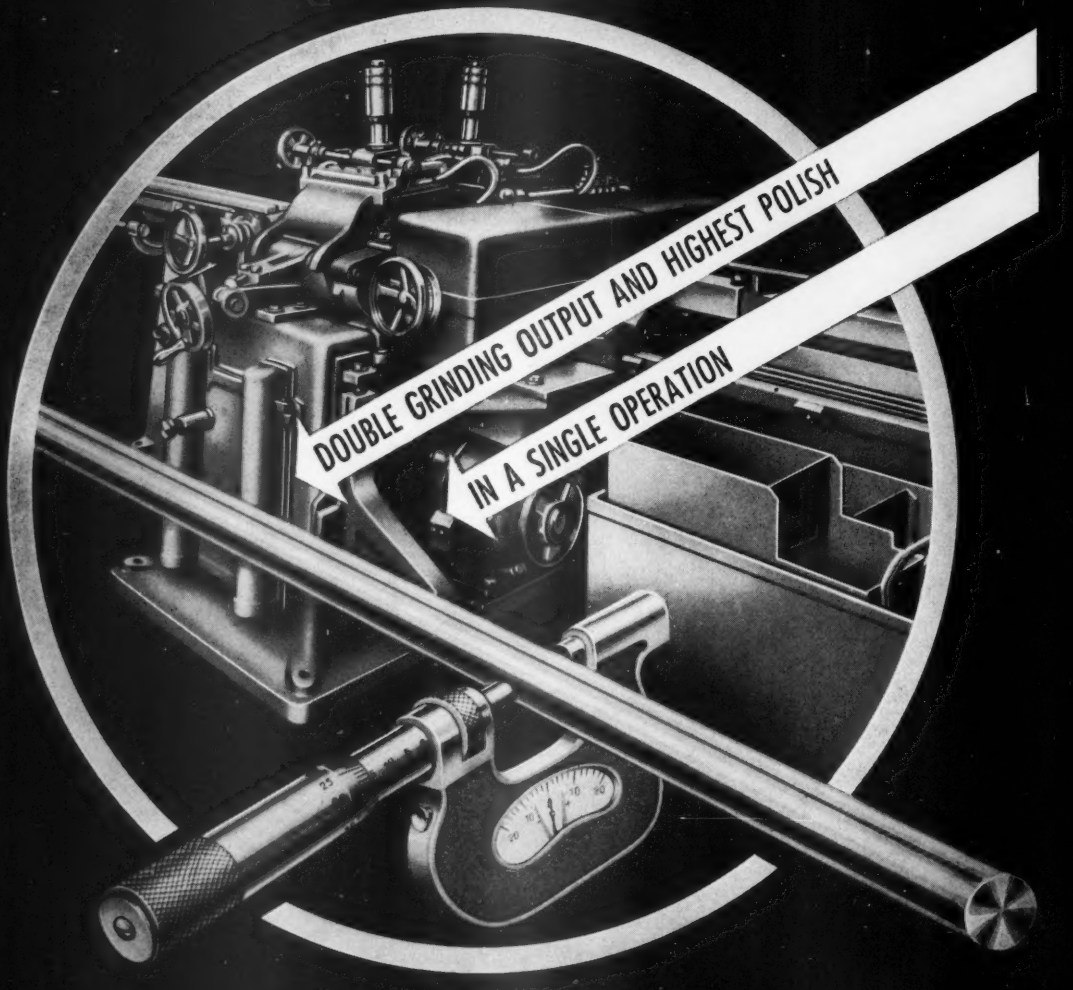

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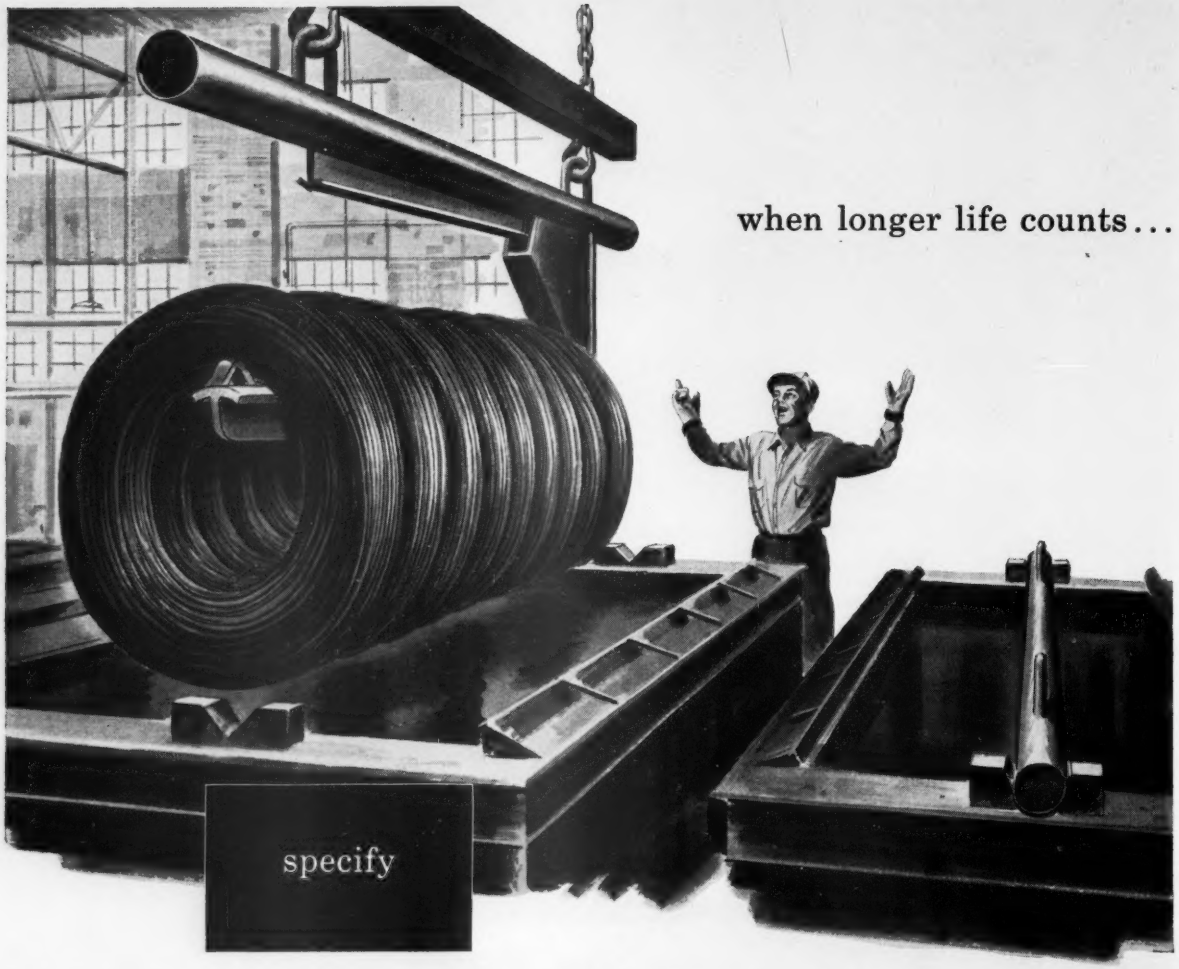

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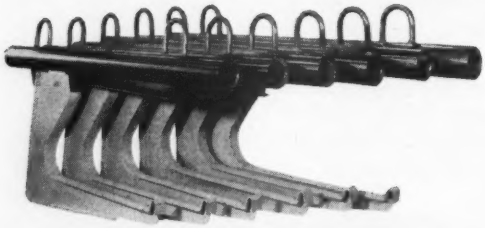

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Are available in two types of construction and six sizes for a wide range of application.

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For extremely corrosive conditions can be supplied on order in a range of sizes.

Designed for tough jobs . . . dependable performance . . . longer service life, LEWIS acid-resistant Monel hooks give you substantial savings in maintenance and replacement costs.

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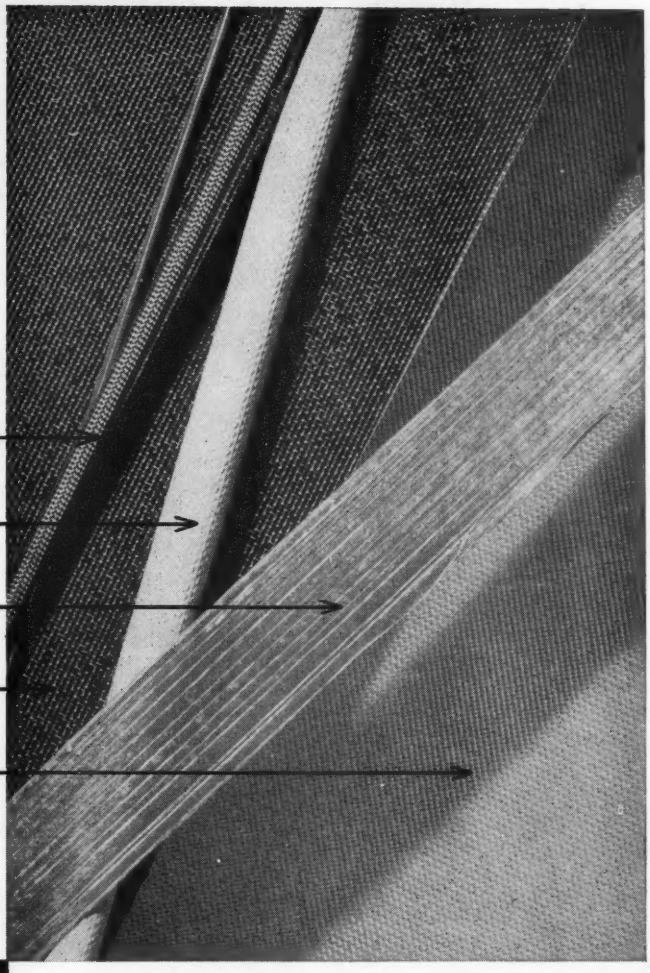

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directly from 1/4" down to .032"?

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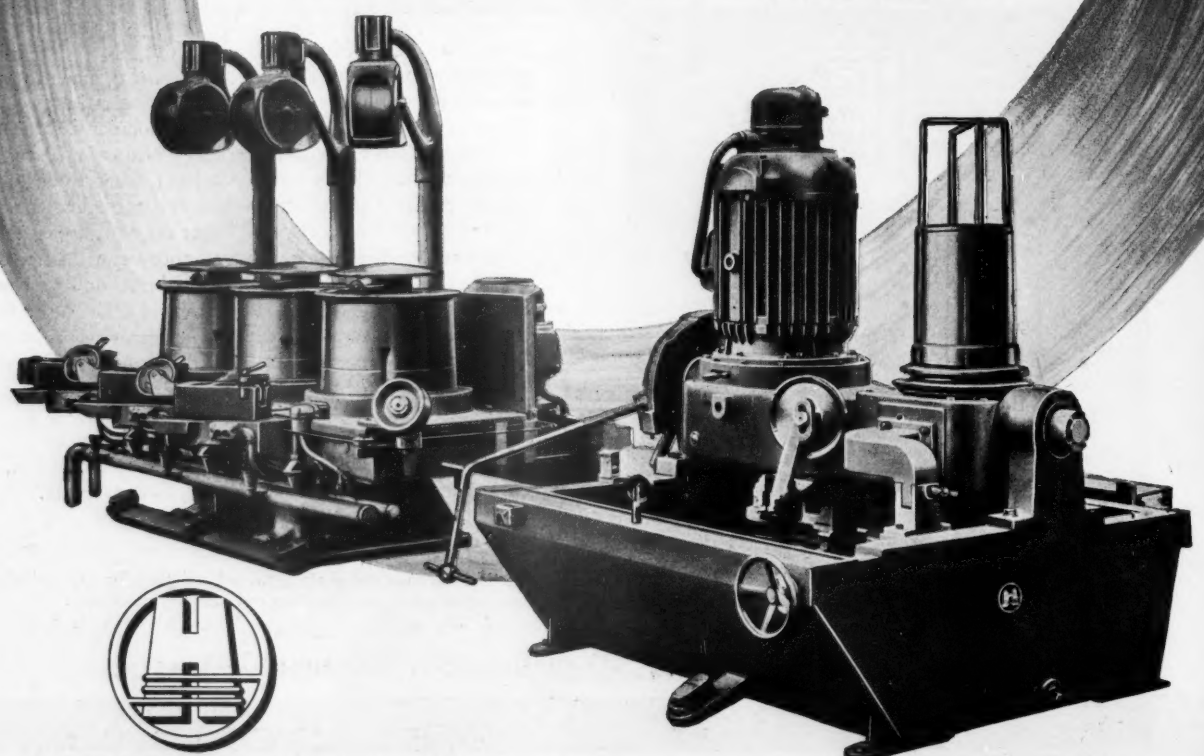
Please send us your inquiries. We shall be glad to submit quotations.



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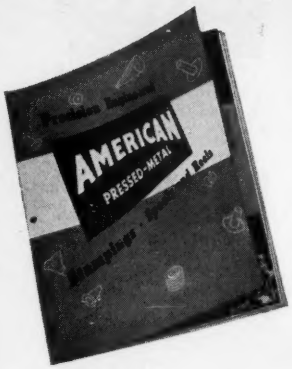

Send for your free copy of our latest bulletin on American Pressed-Metal Spools and Reels. It contains full details and charts on the many standard types.

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Name your need . . . there's an American pressed-metal reel or spool to meet it. And if our long list of standard sizes doesn't contain the model you need, we'll custom-build one to your exact requirements.

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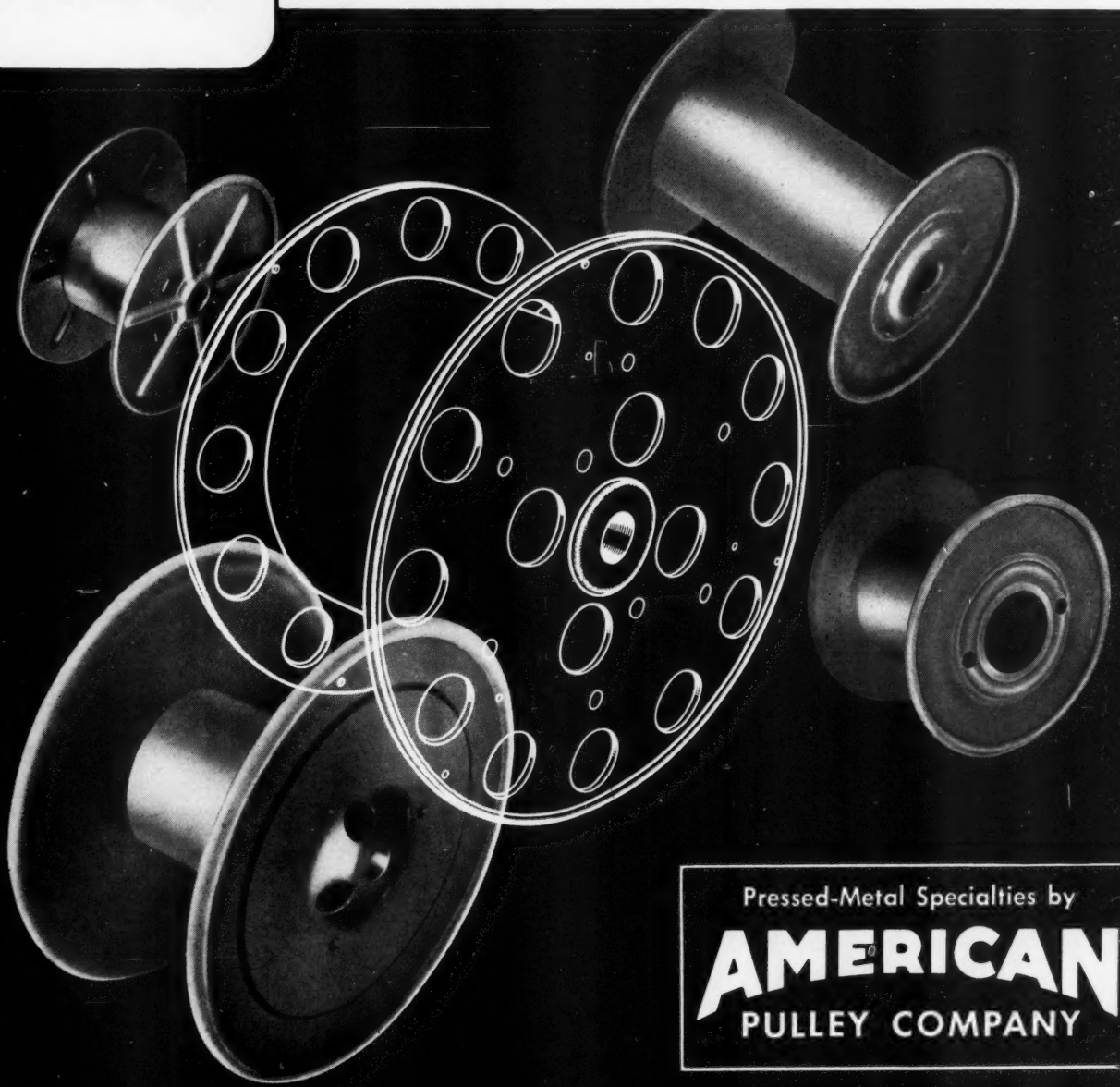

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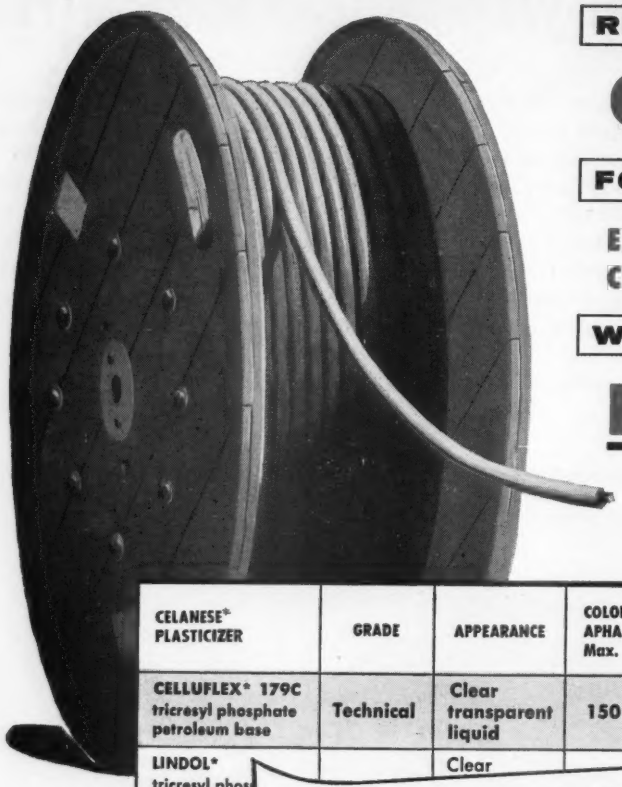


RECOMMENDED

CELLUFLEX* 179C

FOR

ELECTRICAL WIRE AND CABLE COATINGS

WHY

FLAME RESISTANCE

DESCRIPTIVE DATA

CELANESE* PLASTICIZER	GRADE	APPEARANCE	COLOR APHA Max.	SPECIFIC GRAVITY @ 20/20° C.	ACIDITY	ESTER VALUE % Min.	PERMANGANATE TIME, Min. (In Minutes)	REFRACTIVE INDEX @ $n\frac{20°\,C.}{D}$
CELLUFLEX* 179C tricresyl phosphate petroleum base	Technical	Clear transparent liquid	150	1.165 ± .005	0.01 (3)	99	30	1.553 (5)
LINDOL* tricresyl phos… coal tar ba…		Clear						…56
CELLUFLEX dibutyl ph…								…389
CELLUFLEX a mixed est…								…0 (5)
CELLUFLEX* triphenyl ph…								1.550 (6)
CELLUFLEX* DOP dioctyl phthalate	Technical	Clear transparent liquid	50	0.985 ± .002	0.01 (2)	98	—	1.4859

now available in limited commercial quantities

CELLUFLEX 179 EG

Ask your Celanese representative about this new electrical grade Tricresyl Phosphate, specially developed for insulation applications.

(1) @ 60/60°C. (2) % as phthalic, max. (3) % as phosphoric, max. (4) Molten (5) @ $n\frac{25°\,C.}{D}$ (6) @ $n\frac{60°\,C.}{D}$

Celluflex 179C — tricresyl phosphate commercially developed by Celanese—is recognized as the No. 1 flame-resistant plasticizer. Its low volatility, excellent solvent power and high degree of permanence produce tough flexible vinyl coatings for transformer wires and electrical cable.

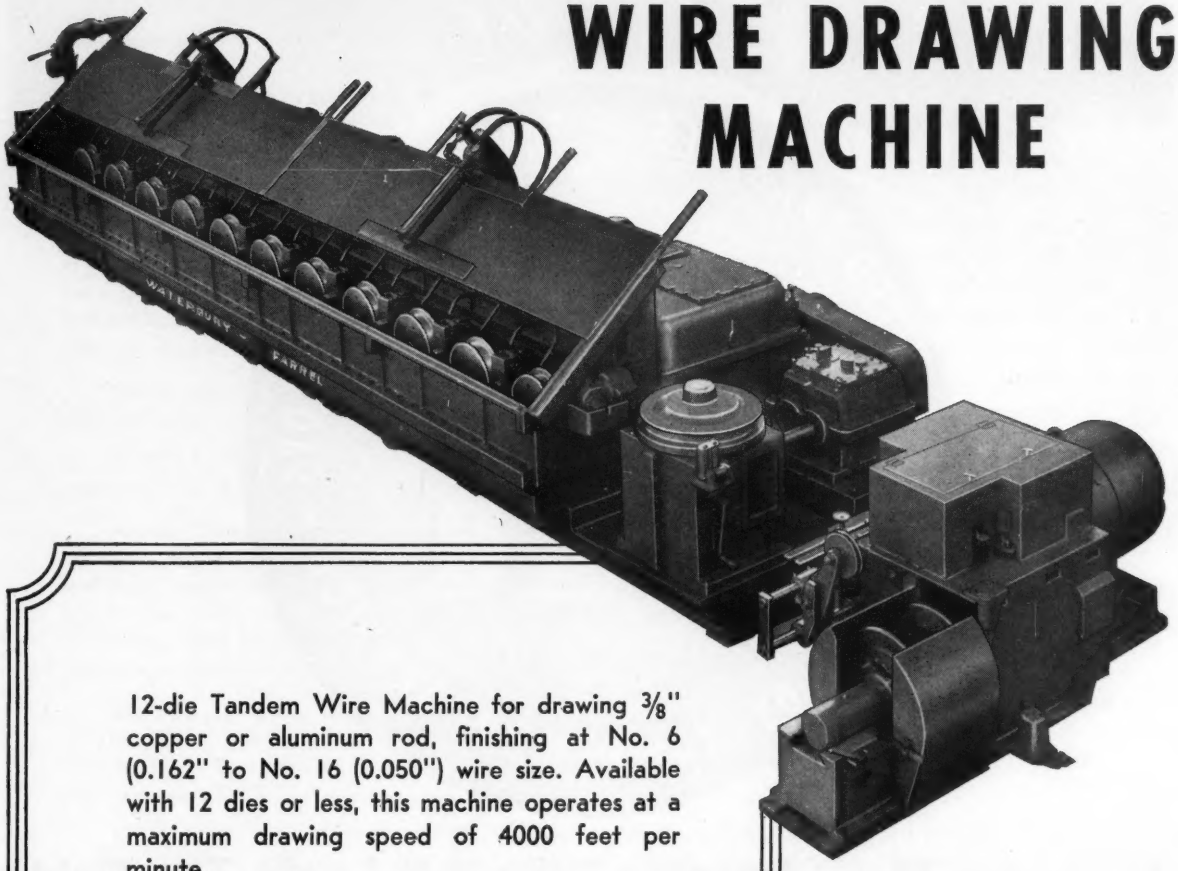
Celanese is an expanding source of plasticizers for many jobs. Bulk stocks at convenient distribution points are ready to meet tight schedules. Combination shipments—Celanese Plasticizers and Solvents or Intermediates—yield an extra dividend in price differential and freight savings. Be on our mailing list for new plasticizer developments. Please drop a card to Dept. 590-B. Celanese Corporation of America, Chemical Division, 180 Madison Avenue, New York 16.

*Reg. U. S. Pat. Off.

Celanese* CHEMICALS

4000 FEET PER MINUTE

WITH THIS WATERBURY-FARREL 12-DIE TANDEM WIRE DRAWING MACHINE



12-die Tandem Wire Machine for drawing 3/8" copper or aluminum rod, finishing at No. 6 (0.162" to No. 16 (0.050") wire size. Available with 12 dies or less, this machine operates at a maximum drawing speed of 4000 feet per minute.

It can be furnished for drawing on spools, or coils, or as a combination machine for both as shown.

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WATERBURY FARREL FOUNDRY & MACHINE CO. • WATERBURY, CONN.

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WIRE MILL EQUIPMENT—Continuous Wire Drawing Machines (Upright Cone and Tandem) • Wire Flattening Mills • Chain Draw Benches • Pointers • Swagers • Bull Blocks • String-up Machines • Spoolers, etc. *COLD PROCESS BOLT & NUT MACHINERY*—Headers (all types) • Rivet Machinery • Trimmers • Thread Rolling Machines • Slotters • Nut Formers and Tappers, etc. *POWER PRESSES*—Crank, Cam and Toggle; also Rack and Pinion Presses • Eyelet Machines • Multiple Plunger Presses • Horizontal and Hydraulic Presses, etc. *MILL MACHINERY*—Rolling Mills: Strip, Rod, Wire Flattening, (For Ferrous and Non Ferrous Metals) • Also Slitters • Straighteners • Cut-off Saws • Coilers • Winders, etc.

FOUNDED WATERBURY FARREL 1851

For the FINEST Dies...

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There Are Many Reasons Why V-R Leads The Field!

V-R NEW Cylindrical nib and improved method of assembly insure high degree of concentricity.

V-R . . . First in producing the only Tantalum-Tungsten carbide developed specifically for Drawing Dies.

V-R . . . First to manufacture Carbide Dies with preformed rough cored back relief.

V-R . . . First to furnish Carbide Dies rough cored to finish at hole sizes below .010".

WRITE TODAY for NEW Vascoloy-Ramet Die Catalog VR-461.

The New V-R Die Catalog gives complete ordering information on all V-R Dies for drawing wire, rod, bar and tube.

Vascoloy-Ramet CORPORATION

880 MARKET STREET

WAUKEGAN, ILLINOIS

The Wire Outlook

The year has gotten under way with considerably higher production schedules and much optimism.

Inventory reductions appear to have ended, which is good news for business generally, as sell-offs of inventories were a drag on output up to near the end of last year.

Nevertheless, a lot of the boom talk going around has been greatly exaggerated, as there is no indication that the up-swing in business will be more than a gentle rise—a good year, but not a record-breaking one.

Steel production should average 80% of capacity in 1955, with the auto industry setting the pace for prosperity in general. Highway, state and municipal construction programs will parallel the activities of the automotive industry to keep production levels high and employment good.

What the economists see, looking ahead, is that 1955 will have a broad trend upward, 1956 will enjoy continued good business in the first half and probably slightly better in the second, and 1957 will be a good year to watch carefully for signs of readjustments. It should be kept in mind that business forecasting is not a precise science, but more of an art in which expert opinion weighs foreseeable factors. The "X" factors are conditions that arise that could not be predicted; such as strikes or wars.

Money policies are something to watch in making forecasts. At this time money is being kept fairly abundant and low in cost. Easier mortgage and installment terms are having an effect on purchasing.

In 1953 a "tight money" policy had quick and severe effects that was felt through 1954. Changes in money policies will therefore be approached by the present Administration with the greatest caution.

Among the major metals the outlook this year is for a production of 95 million ingot tons of steel, as against 88 million in 1954; aluminum production should total 3.2 billion pounds, up 300 million over last year; copper production has rebounded and refining and fabricating operations should be somewhat higher than in the preceding year. Copper is still tight, but no longer dangerously so. Nickel production in the free world reached 390 million pounds in 1954, about 50% higher than in 1949. 286 million pounds came from Canada. An increase of 25 milion pounds is predicted for 1955.

The Federal Reserve Board expects that personal incomes will rise 2 billion dollars this year to a total of 287 billions, with the industrial production index averaging 130 to 131, as compared with 1954's index of 124. Prices may advance 1 to 2% and profits in the metalworking industries should run 5 to 10% better than last year.

Manufacturers of welded wire fabrics for reinforcement are anticipating a good year and if the predictions regarding highway, building construction and concrete pipe production materialize, their hopes will be realized.

Shipments of manufacturers' wire, heading stock and other industrial wire items have risen. Automotive wire orders, of course, are substantial and music wire production has been stepped up in anticipation of better demand. January shipments of wire were the heaviest in months. At this season, merchant wire products also are being readied for Spring demand.

The birth rate of the country continues high. 4.1 million future citizens came into the world in 1954, which is the largest number ever recorded, except for 1947, when 26.2 babies per 1000 women were born. The rate for 1954 was 25.2 per thousand. There is every indication that the high rate of births will be continued in 1955. All of this means a good future demand for wire for houses, schools, appliances and many of the products consumed in the home. The baby boom, starting in 1940, is now in its fifteenth year.

With all these plusses, the minus factors that are always in the offing should not affect us too seriously. The thing to guard against is not a depression, but any reckless talk of a boom.

—from the Editor's Desk

1 **Co-ordinated research, development and production**

. . . careful control of manufacture, through continuous research and testing, insures uniformity of all Steelskin products.

2 **Warehousing-in-stock supply**

. . . guarantees an adequate supply of the Steelskin products you need at all times — preventing possible production slow-down.

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 30 FEBRUARY, 1955 No. 2

Hot Dip Galvanizing Is A Science

by Wallace G. Imhoff, President
The Wallace G. Imhoff Company
Los Angeles, California

Part I

The author states that scientific principle number one is that the higher the galvanizing bath temperature, the heavier deposit of zinc and, conversely, the lower the bath temperature, the lighter the coating of zinc.

This is the first of a series of articles by Mr. Imhoff, well-known galvanizing consulting engineer, who is preparing a complete series of treatises on the subject for this publication.

Science is organized or classified knowledge. The discovery of natural laws and truths when applied to hot dip galvanizing operations gives the highest quality product at the lowest cost. The nearer operations are conducted according to basic scientific truths and principles, the lower the amount of by-products made, the smaller the amount of materials used, and the higher the quality of the product.

★ ★ ★

The greatest progress in placing hot dip galvanizing operations on a scientific basis has been made in the past thirty-four years; that is since 1920. Previous to that time most of the actual knowledge of hot dip galvanizing was the personal property of the operators, and good or bad results were obtained according to the experience and skill of the men doing the work. In many plants working conditions were unbearable; steam, acid fumes, flux fumes, poor ventilation, heat, and abominable working conditions were the usual conditions, and most galvanizing plants were shunned by management.

★ ★ ★

In many plants the plant bricklayer was in charge of building and repairing the galvanizing furnace. He learned by costly failures and the life and operating service of the equipment came under his supervision. It was not until 1916 that real engineering principles appeared. Most of the galvanizing furnaces up to this time were heated with coke fuel, with the worst kind of combustion engineering principles, in fact no principles at all since the fuel lay directly on the floor without even grates to separate the ashes from the live fuel. In one plant the coke loss was 34% because the coke could not burn completely in the ashes.

Natural gas as a fuel was used to some extent in the Pittsburgh District, and other cities where natural gas was plentiful. In New York City, where oil was available for export, some companies were using oil fuel. In these districts the design of the galvanizing furnace had been improved as a result of many costly failures. But in the large majority of cases galvanizing furnaces were of such poor design that many pots failed in a few weeks, or a few months time. There just was not any science used in either furnace construction or galvanizing operations at this time; it was practically all hit and miss practical experience gained in each plant by one costly failure after another.

★ ★ ★

In 1916 The Surface Combustion Company introduced the surface combustion burner, and also introduced the first real engineering in the design of the galvanizing furnace. But gas fuel also introduced many violations of hot dip galvanizing principles, and therefore the next few years were years of experimentation of

the proper heat application to keep from destroying the galvanizing pot in a short time. Heat was applied at the bottom of the pot, then the middle, and even at the top.

★ ★ ★

In 1920 a Fellowship on hot dip galvanizing was set up in the Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh, Pa. The writer had that Fellowship and conducted research investigations on all phases of hot dip galvanizing for the next five years. This Fellowship was sponsored by sixteen companies including such metal ware plants as The Republic Metal Ware Company of Buffalo, N. Y., The Lisk Manufacturing Company, Canandaigua, N. Y., National Enameling & Stamping Company, Wheeling Steel Company, and others.

★ ★ ★

A period of probably ten years passed when real engineering principles were being applied to galvanizing furnace designs, and the gradual evolution of the basic scientific principles of hot dip galvanizing were being accepted by the galvanizing industry. One of the unforgettable moments was when after careful research work the writer, at one of the quarterly meetings of the Association sponsoring the Fellowship, made the statement, that it is a definite scientific galvanizing principle, that—"the higher the galvanizing bath temperature, the heavier the zinc will be deposited as galvanized coating, and vice versa, the lower the galvanizing bath temperature, the lighter the zinc will be deposited as galvanized coating." Up to this point the meeting had been quiet, and to the writer's consternation, this statement was just like tossing a bomb into the meeting. Bedlam let loose for the next few minutes; even shouts that such conclusions were sheer nonsense were heard, and the writer's ability and qualifications to do the research work were questioned. The whole meeting was devoted to discussing results, which from the many years of practical experience of the members, was known to be exactly the opposite of the principle stated by the writer. It was the beginning of the Fellowship and research work, and from all appearances it looked like the writer had gotten off to a very bad start. The uproar kept up for over half an hour with the members gathering in little groups to voice their angry opposition to a statement they knew from their long experience, just was not true. .

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The statement was so contrary to facts known at that time that a committee was formed at once, the object of which was to prove under practical operating conditions, that the higher the galvanizing bath temperature, the more zinc was deposited as galvanized coating. Even up to the present time the galvanizing literature does not contain a complete list of all the scientific principles of galvanizing under one cover. That is the purpose of the present series of articles, to bring all of the known hot dip galvanizing principles under one cover.

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Attention is called to the fact that modern galvanizing practice is such that many of the principles are not permitted to operate freely. Research investigations have shown that the speed of withdrawal affects the weight of zinc deposited, but as a typical example of how practical operations have interfered with the free operation of this scientific principle, the wipes in the hot dip galvanizing of wire, and the rolls in the hot dip galvanizing of sheets, give a different weight of coating as compared to a galvanized pail or tub that are slowly withdrawn from the galvanizing bath, and the zinc allowed to drain freely from the article.

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One of the reasons that scientific principles have been extremely difficult to discover in hot dip galvanizing, is because when galvanizing every kind of article in all fields of galvanizing, some conditions favor a lighter zinc deposit, while at the same time, other operating conditions tend to give a heavier zinc deposit. Thus the actual weight of zinc deposited as coating then is always a compromise, or the results of conditions working against each other. As a typical example suppose a heavy ship plate is being hot dip galvanized. Because of the thickness of the steel plate the bath temperature must be held to a very low point, 820 to 825 degrees Fahrenheit. With the proper sub-

Fig. 1—Sheet Galvanizing: Leeds & Northrop Micromax Temperature Control. Note the straight-line temperature curve; a rise or fall of bath temperature increases or decreases the weight of the zinc deposited as galvanized coating.

mersion time the amount of zinc deposited will be about 1.8 ounces per square foot. To obtain the correct finish there is a correct submersion time in the molten zinc bath, namely the time it takes to bring the temperature of the plate up to the temperature of the molten zinc. When the plate has reached the bath temperature, then there is a correct withdrawal speed to give the coating a uniform thickness all over the plate, and also to give the correct amount of zinc as deposited galvanized coating.

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With a large number of scientific principles operating at the same time, some tending to give a heavy zinc deposit and some tending to give a light zinc deposit, it would be expected that the results of some of the principles would be confused. The only way to actually discover what is happening with each principle is to hold all conditions constant except the principle that is being studied. This was done, and the results are shown in Table 1.

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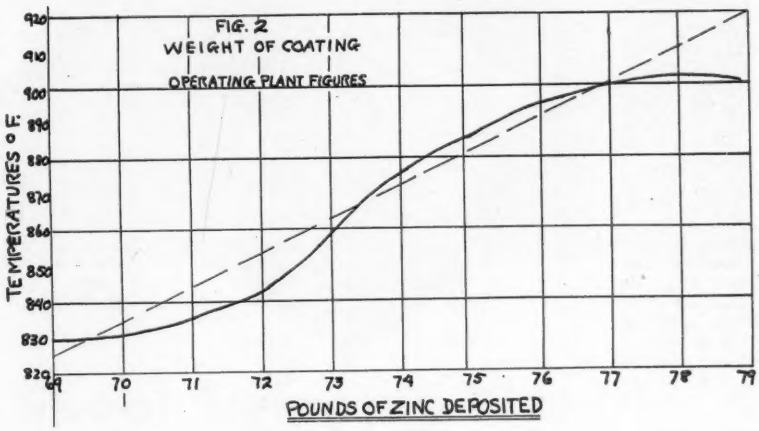
Here is a test that holds all variables constant and in which definite controlled conditions of temperature are set up. The results show extremely clear, and illustrate the principle that "the higher the galvanizing bath temperature, the heavier the zinc will be deposited as coating, and vice versa, the lower the galvanizing bath temperature, the lighter the zinc will be deposited as galvanized coating." See Fig. 2.

★ ★ ★

This basic hot dip galvanizing principle holds in all fields of hot dip galvanizing, and for all kinds of articles. It would be extremely difficult to establish this basic principle in wire galvanizing. As an example, one authority states that a 13 gage steel wire has a coating of 2.4 ounces of zinc per square foot of surface. No bath temperature is given, which, as we have just pointed out, is one of the important factors in determining how much zinc will be deposited as galvanized coating. Granting that all other factors are held constant, then from the above table we know that if a lower temperature was used in galvanizing this 13 gage steel wire, that the weight of zinc deposited as coating would be less than 2.4 ounces per square foot of surface, and if the bath temperature used were higher, then the weight of zinc deposited as galvanized coating would be more than 2.4 ounces of zinc per square foot of surface.

TABLE 1 - WEIGHT OF COATING AT VARIOUS GALVANIZING BATH TEMPERATURES ARTICLE - 12 Quart Water Pail

Bath temp, Deg. Fahr.	Time of Submersion Seconds	Withdrawal Seconds	Production Dozens per hour	Weight of Zinc Coating Lbs. per gross
800	24.0	11.5	12.5	60.0
805	22.8	11.0	13.5	61.0
810	21.7	10.5	14.5	61.5
815	20.6	10.0	15.6	62.3
820	19.4	9.5	16.6	63.0
825	18.2	9.0	17.7	63.7
830	17.0	8.5	18.7	64.4
835	15.9	7.9	19.7	65.0
840	14.7	7.4	20.7	65.7
845	13.5	6.9	21.0	66.4
850	12.4	6.4	22.8	67.1
855	11.2	5.6	23.6	67.8
860	10.0	5.3	24.8	68.5
865	8.9	4.8	25.9	69.2
870	7.7	4.3	26.9	70.0
875	6.5	3.7	27.9	70.7
880	5.4	3.2	28.9	71.3
885	4.3	2.7	29.9	72.0
890	3.1	2.2	31.0	72.6
895	2.0	1.6	32.0	73.3
900	0.9	1.1	33.0	74.0



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In every field of hot dip galvanizing there are many variables, and the variables in one field are different from the variables in another field. However, the underlying basic principles of galvanizing are the same for all fields. Since in the final picture, galvanizing costs are the most important factor in any field, a complete knowledge of all the basic galvanizing principles will aid greatly in holding costs down to the lowest possible figure. To illustrate how the different variables do affect galvanizing costs, an example is given below, showing how the lowest costs may be found. See Table 2 on next page.

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The above tests were made on productions of 84, 96 and 108 pieces per hour coated. The selection of the right production based on the quality of the product and the galvanizing cost gives the standard shown below:

First Choice

Cost $9.85
Production ..... 96 pieces/hr.
Bath Temperature .. 865 Deg. F.
Zinc Deposited .. 86.00 Lbs./100

TABLE II

SPEED, TEMPERATURE AND ZINC DEPOSITED IN COATING EXTRA-HEAVY REINFORCED CEMENT PAIL WITH AREA OF 688 SQUARE FEET PER 100 PIECES.

(TEST MADE WITH A FIVE-MAN GANG)

Quantity per hour	84 pieces		
Standard Time	5.95 hours		
Bath Temp. Deg. F.	875	865	855
Lbs. zinc/100	86.00	83.50	81.00
Zinc cost/100 @ $0.0842	7.24	7.03	6.82
Labor cost/100 @ $0.50/hr.	2.98	2.98	2.98
Total Cost	10.22	10.01	9.80

Quantity per hour	96 pieces		
Standard Time	5.21 hours		
Bath Temp. Deg. F.	875	865	855
Lbs. zinc/100	88.50	86.00	83.50
Zinc cost/100 @ $0.0842	7.45	7.24	7.03
Labor cost/100 @ $0.50/hr.	2.61	2.61	2.61
Total Cost	10.06	9.85	9.64

Quantity per hour	108 pieces		
Standard Time	4.61 hours		
Bath Temp. Deg. F.	875	865	855
Lbs. zinc/100	91.00	88.50	86.00
Zinc cost/100 @ $0.0842	7.66	7.45	7.24
Labor cost/100 @ $0.50/hr.	2.31	2.31	2.31
Total Cost	9.97	9.76	9.55

Second Choice

Cost $10.01
Production ..... 84 pieces/hr.
Bath Temperature .. 865 Deg. F.
Zinc Deposited .. 83.50 Lbs./100

The first basis for the selection of any cost must be based upon the quality of the product. The lowest cost is seen to be $9.55 for a production of 108 pieces at a bath temperature of 855 degrees Fahr. However, this standard was not chosen because the quality of the product was not acceptable.

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The results of this test also prove conclusively that "the higher the bath temperature, the heavier the zinc will be deposited as coating, and vice versa, the lower the galvanizing bath temperature, the lighter the zinc will be deposited as galvanized coating." All three tests at productions of 84, 96, and 108 pieces per hour show this principle to be true.

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The influence of the bath temperature is far reaching and has many complications. Little wonder that the practical man has been confused, and has even believed the exact opposite of the true galvanizing principle to be true. If the bath temperature is too high for the thickness of the base metal, then when the article is withdrawn from the bath, the excessive heat will burn the surface finish white. On ship plates the finish is not only white but is webbed like a woven wire fence. If the temperature is far in excess of that required, the finish will be a dark greenish almost black color. This color is due to the olive green color of the zinc oxide formed from the excessive heat which is held by the plate. Thus the reason for use of a very low bath temperature when galvaniz-

(*Please turn to page* 233)

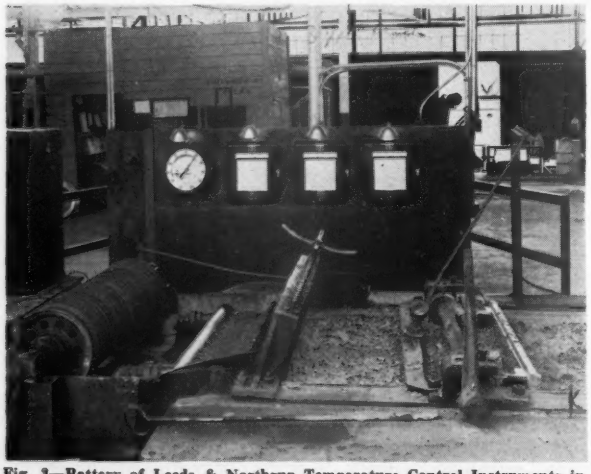


Fig. 3—Battery of Leeds & Northrup Temperature Control Instruments in wire galvanizing plant.

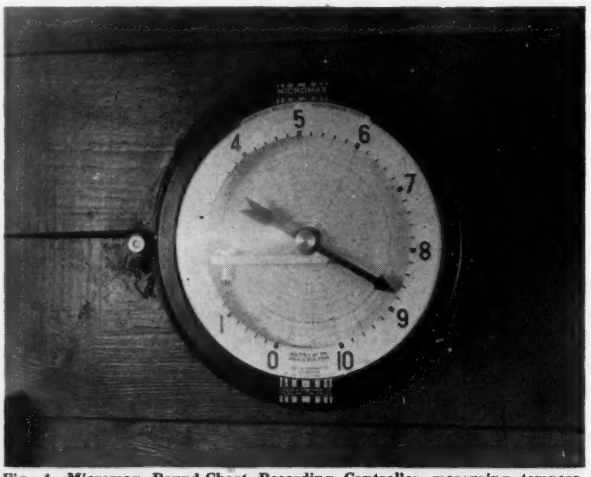
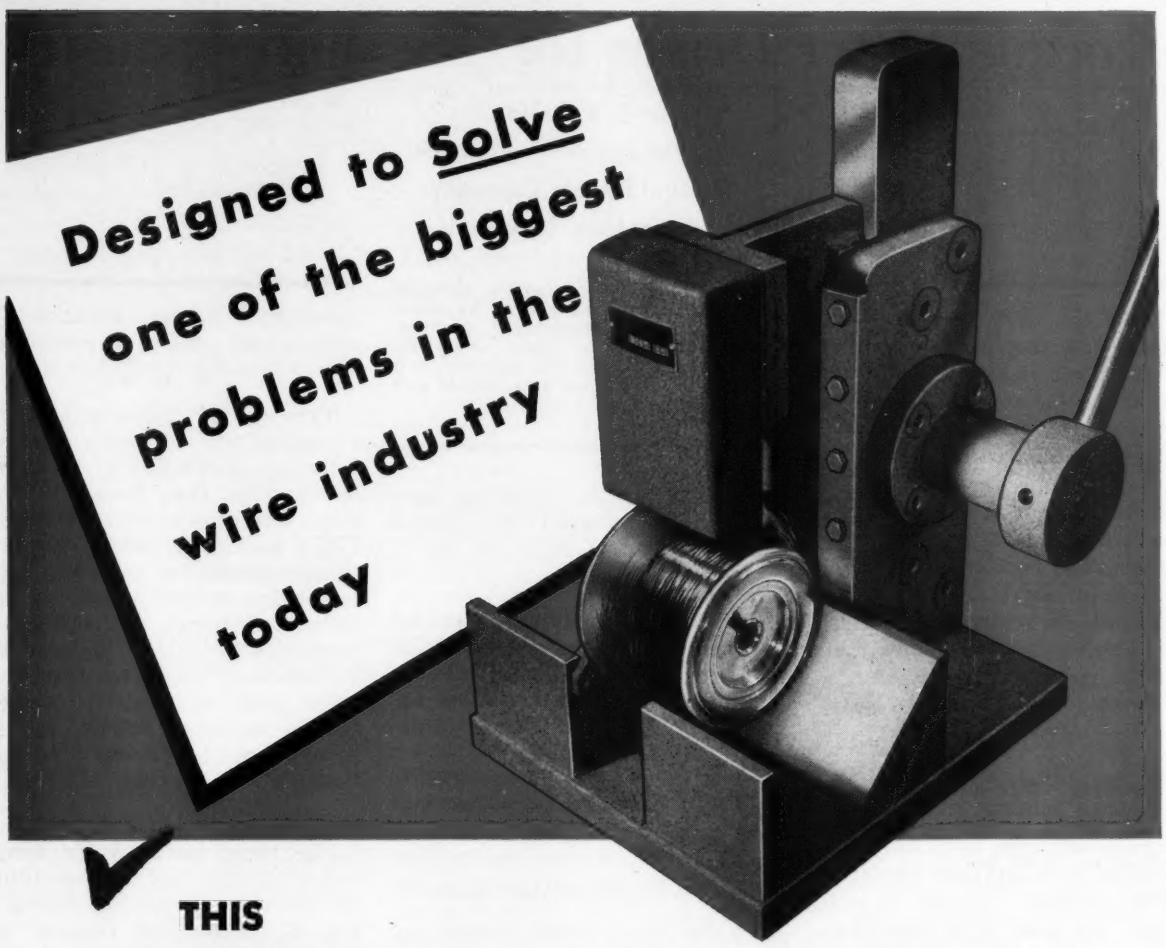


Fig. 4—Micromax Round-Chart Recording Controller measuring temperature of galvanizing bath and operating fuel valve. Operating bath temperature 875 F.



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Torque Motor Drives for The Wire Industry

by R. K. Larson
Industrial Engineering Section
General Electric Company
Schenectady, New York

In this paper, Mr. Larson discusses low cost electric reel drives. The torque motor provides outstanding performance and flexibility. These drives are widely used now in the industry and, because of their advantages, should gain increasingly in popularity.

With the development of electronic and amplidyne regulating systems, all electric, center wind reel drives have enjoyed great success. When substantial power is required mechanical, friction type devices become excessively bulky, require frequent maintenance, waste power, and are difficult to control. The regulated, direct current motor drive eliminates these problems, providing outstanding performance and flexibility at an overall cost comparable to other systems.

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However, for low horsepower drives, where tension, linear speed, or both are low, mechanical slip clutches have captured almost the entire market. In this capacity range the size of a mechanical drive does not become impractical, power losses are relatively unimportant, replacement cost for wearing parts is moderate, and the performance of this type of equipment is acceptable. The regulated, all electric drive is more expensive, and the advantages have not been sufficient to justify the higher cost. It is in this range of low horsepower reel drives that the torque motor can give industry most of the benefits of the all-electric drive at a cost comparable to mechanical drives. See Photo 1.

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The term "torque motor" actually defines a type of application rather than a specific motor. Torque motors may be either a-c squirrel cage motors, wound rotor motors, or any of the standard types of direct current motors. Perfectly standard motors may be used, although generally more torque can be obtained from the given frame if the motor has been specifically designed for torque motor service.

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Wound rotor motors have proved to be most adaptable for this service. Direct current motors are relatively expensive for this application, the control is more complicated than for wound rotor motors, and few customers wish to add constant potential, direct current load.

How the Torque Motor Operates

While many torque motors are in service, this is not a widely known type of application for a wound rotor motor. Therefore, the method of using wound rotor motors for this service will be described before selection of motors and control is considered.

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Typical load characteristics for a constant tension, center wind reel drive are shown in Fig. 1. It will be observed that these are constant horsepower load curves. In Fig. 2 is shown a family of speed-torque curves for a wound rotor motor for several values of secondary resistance. Increasing the secondary resistance reduces the curvature of the motor characteristics until, at about 70 percent normal secondary ohms, the inherent speed-torque curve is practically a straight line.

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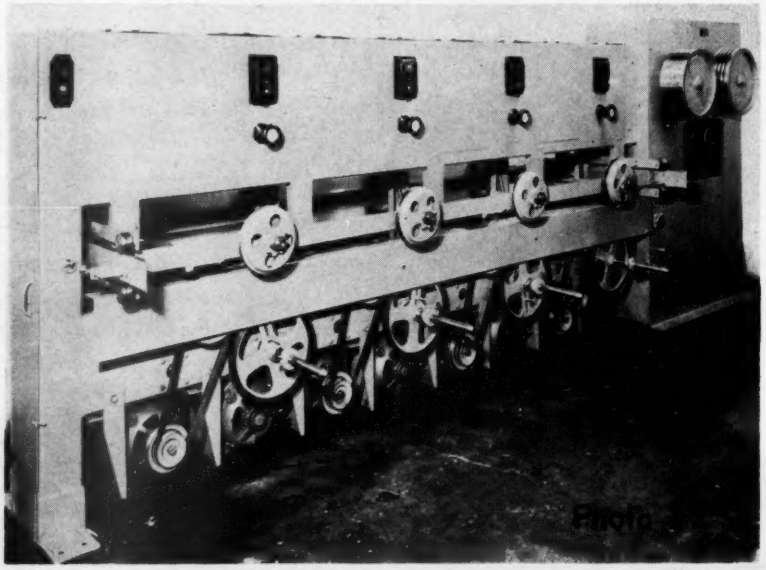
The basic wound rotor torque motor circuit and the resulting speed-torque curves are shown in Fig. 3. The fixed resistor will usually be 70 percent normal ohms or more. The rheostat may provide adjustment from this value to as much as 1000 percent normal ohms.



Enamelling line take-up stand using frame 225, squirrel-cage torque motors for #16 to #28 AWG copper wire at 100 fpm and lower. * * * * * * * * * * *

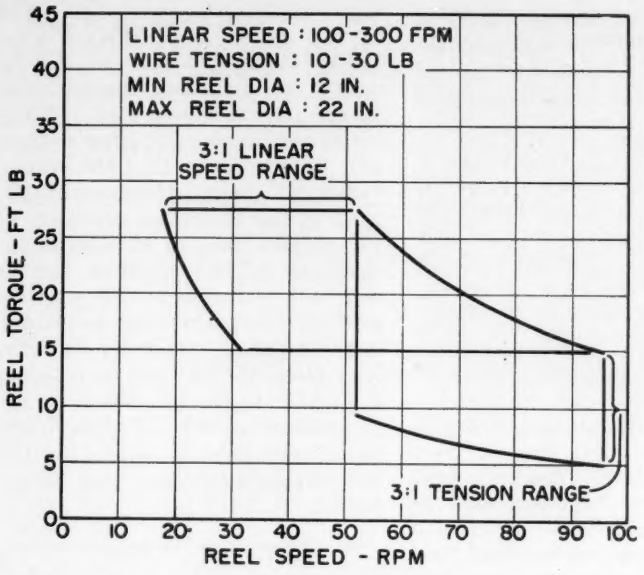
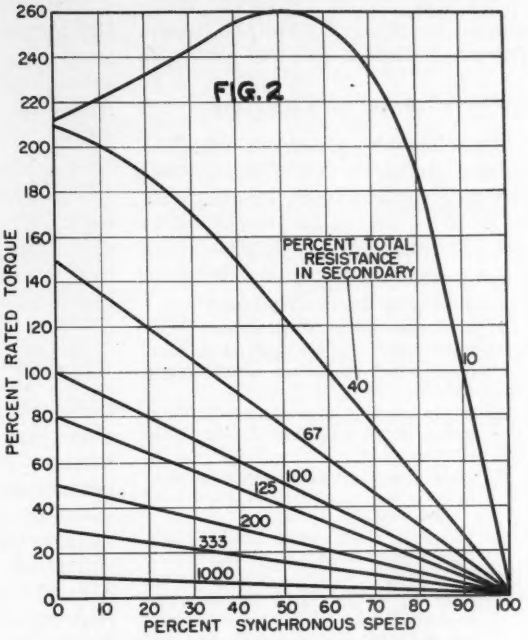
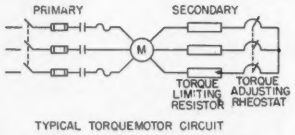

LINEAR SPEED : 100-300 FPM
WIRE TENSION : 10 -30 LB
MIN REEL DIA : 12 IN.
MAX REEL DIA : 22 IN.
3:1 LINEAR SPEED RANGE
3:1 TENSION RANGE
REEL TORQUE - FT LB
REEL SPEED - RPM

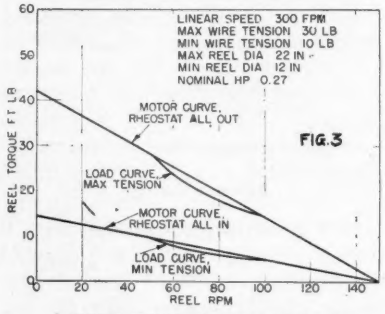
FIG. 1 TYPICAL LOAD CURVES FOR CONSTANT TENSION REEL DRIVE



TYPICAL WOUND ROTOR MOTOR SPEED TORQUE CURVES FOR SEVERAL VALUES OF SECONDARY RESISTANCE



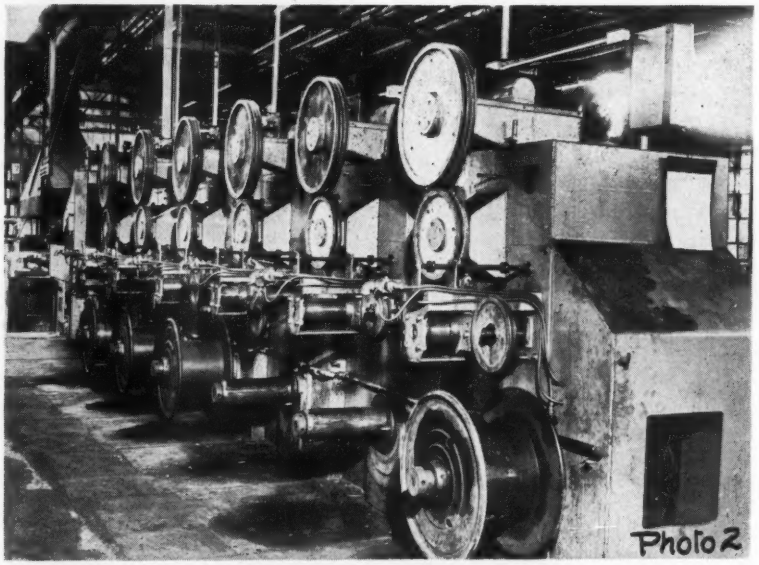
TYPICAL TORQUEMOTOR CIRCUIT


LINEAR SPEED 300 FPM
MAX WIRE TENSION 30 LB
MIN WIRE TENSION 10 LB
MAX REEL DIA 22 IN
MIN REEL DIA 12 IN
NOMINAL HP 0.27
MOTOR CURVE, RHEOSTAT ALL OUT
FIG. 3
LOAD CURVE, MAX TENSION
MOTOR CURVE, RHEOSTAT ALL IN
LOAD CURVE, MIN TENSION
REEL TORQUE FT LB
REEL RPM

EXAMPLE OF MATCHING MOTOR CHARACTERISTICS WITH CONSTANT TENSION LOAD CURVES

Although the term "constant-tension" is used in conjunction with most reel drives, very few reeling applications require absolutely constant tension. However, the assumption of constant tension provides a convenient starting point for determining the drive capacity required. It also affords a logical basis for comparison of reel drive performance. Very frequently it is desirable to have the tension decrease as the reel fills. In many cases acceptable performance may be obtained when the tension increases as the reel fills. The limits on permissible tension variation depend a great deal on the material being reeled, but a tension variation of more than 2:1 can seldom be tolerated. Thus, for a full to empty reel diameter ratio of 2:1, a constant torque drive characteristic will usually be ade-

Torque motors are only suitable for reeling applications in which the linear speed of the material is firmly established by a separate drive. Under this condition, the torque motor must slow down as the reel fills with material and the reel diameter increases. As it slows down, the motor torque will increase as shown by the motor speed-torque characteristics. It will be seen from Fig. 3 that this characteristic may be selected to closely match the desired load (tension) speed-torque curve.



Tinning line take-up stand using frame 224 wound rotor torque motors for #6 to #22 AWG copper wire at 650 fpm and lower.

quate. For higher ratios the drive should approach a constant horsepower characteristic. See Photo 2.

Information Required

To select any reel drive, whether torque motor or other, the following information must be obtained, in addition to the acceleration and deceleration characteristics of the main processing machine drive:

1. **Maximum linear strip speed.**
2. **Minimum linear strip speed.**
3. **Maximum tension required at maximum and minimum linear strip speeds.**
4. **Minimum tension required at maximum and minimum linear strip speeds.**
5. **Minimum diameter, maximum diameter, and capacity of each reel to be used.**
6. **Is linear strip speed firmly established by a separate drive.**
7. **Will it be acceptable to change the gear or pulley ratio between the reel shaft and the reel motor shaft for different linear speeds and different sizes of reels.**
8. **Material involved and type of process.**
9. **Any special requirements.**

Selection of Drive Capacity

This is best done by drawing the limiting, constant tension load characteristics and then drawing a motor speed-torque curve that matches the load curve. From these curves the maximum motor torque required at the lowest motor speed, and the range of torque adjustment that must be provided by the rheostat may be determined. This method is illustrated in Fig. 4.

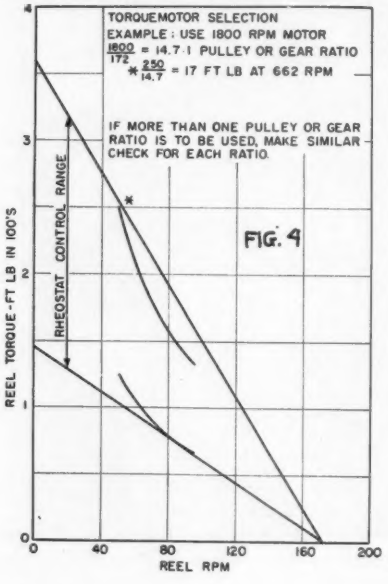


FIG. 4

The continuous torque rating of the motor should be based on the maximum torque required at not more than 120% of the minimum motor speed.

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If a blower ventilated motor is to be used, it is only necessary to select a motor of the desired synchronous speed with full load torque capacity equal to the calculated value.

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If the minimum running speed is not less than 40% of the synchronous speed, the same procedure may be used for an open motor. Standard, open, wound rotor motors will develop 80% of rated torque at 50% speed continuously without overheating. Because of the duty cycle on the normal reel drive, the open motor may be selected to use 100% rated torque at 40% synchronous speed when using the selection method illustrated in Fig. 4.

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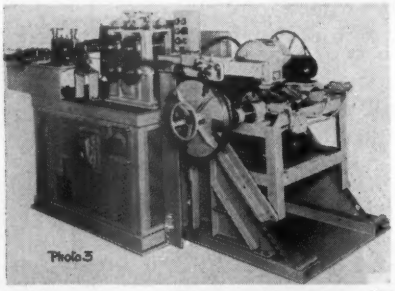
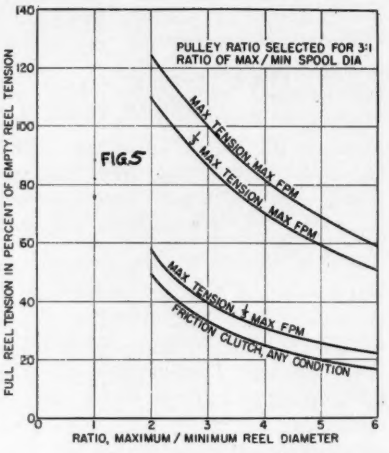
Tabulations of wound rotor motor torque capacity using special torque motor designs are available from the manufacturer. See Photo 3.



Welding wire straightener using frame 224 wound rotor torque motor for 0.25" diameter to .032" diameter steel wire at 600 fpm and less.

Reel Build-Up

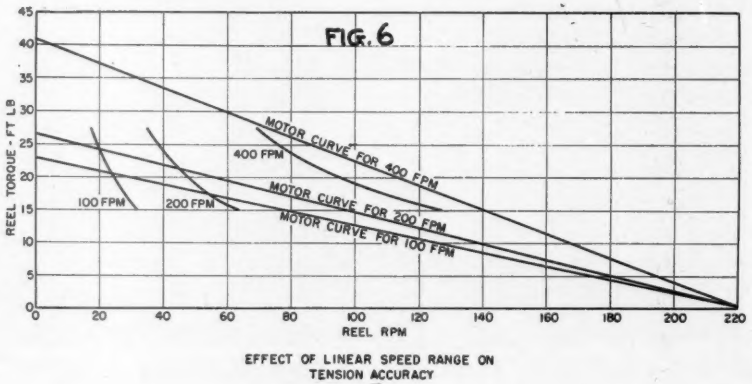
The maximum ratio of full to empty reel diameters for each reel should be considered next. If any single reel has a ratio greater than 3:1, it is unlikely that the torque motor will be satisfactory. If the ratio of the maximum diameter of the largest reel to the minimum diameter of the smallest reel is over 3:1 a torque motor may be used if it is permissible to change gear or pulley ratios for the various reels. If the ratio is between 3:1 and 2:1, evaluate the accuracy of tension required. Figure 5 will be of assistance in estimating the tension variation that may be expected.



TENSION VARIATION FROM EMPTY TO FULL REEL

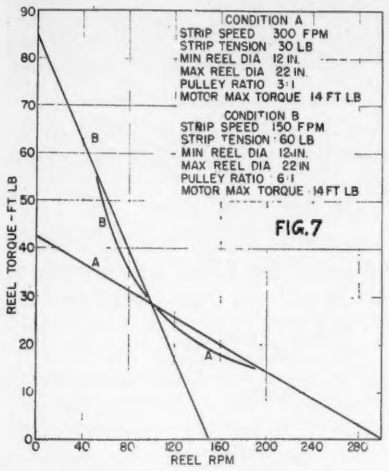
Speed Range

It will be observed from Fig. 6 that the torque motor will provide essentially constant torque for linear speeds lower than 50 per cent of the speed for which the pulley or gear ratio was selected.



EFFECT OF LINEAR SPEED RANGE ON TENSION ACCURACY

From Fig. 7 it may be seen that good tension control may be retained over practically any linear strip range if a gear or pulley ratio change is used. The similarity of change in linear strip speed and the use of several different sizes of reels should be observed. In Fig. 7, curve "B" would also correspond to a strip tension of 30 lbs. at 300 fpm with a 24/48 inch reel.


CONDITION A
STRIP SPEED 300 FPM
STRIP TENSION 30 LB
MIN REEL DIA 12 IN.
MAX REEL DIA 22 IN.
PULLEY RATIO 3:1
MOTOR MAX TORQUE 14 FT LB
CONDITION B
STRIP SPEED 150 FPM
STRIP TENSION 60 LB
MIN REEL DIA 12 IN.
MAX REEL DIA 22 IN
PULLEY RATIO 6:1
MOTOR MAX TORQUE 14 FT LB
REEL TORQUE - FT LB
REEL RPM
0 40 80 120 160 200 240 280
0 10 20 30 40 50 60 70 80 90
A
B
FIG. 7

EFFECT OF PULLEY RATIO CHANGE

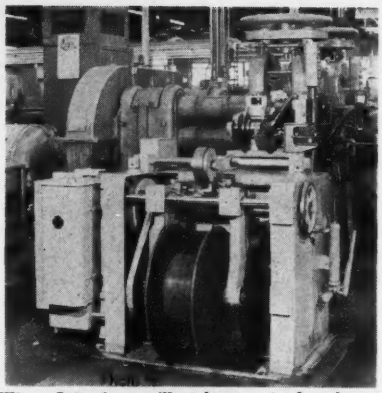
In many cases, larger sizes of material are processed at lower linear speeds. This requires higher torque at the lower speeds. By changing the pulley or gear ratio as shown in Fig. 7, a smaller motor and closer approach to constant tension may be obtained.

Tension Adjustment

Almost any reel drive will require some range of tension (torque) adjustment. As was illustrated in Fig. 3, tension adjustment is obtained by changing the secondary resistance. It has been pointed out that the torque motor is inherently better suited for tension range than for linear speed range. The speed-torque curves will match the constant tension load curves quite closely over a substantial tension range. See Photo 4.

Friction Losses

When a tension range of more than 5:1 is proposed, the friction losses of the drive must be carefully considered. The mechanical components of the equipment



Wire flattening mill take-up stand using a wound rotor torque motor for #6 to #14 AWG copper wire at 600 fpm and less. * * * *

must be selected to match the maximum torque capacity of the drive, and the friction losses will tend to be a constant percentage of this torque rating. As the available motor torque is reduced, the friction torque load may approach or exceed the tension torque load.

★ ★ ★

Variations in friction load may then cause marked variations in strip tension. The friction torque may also be sufficient to prevent the torque motor from reaching the desired empty reel speed unless adequate allowance has been made for the loss torque. The effect of friction losses is illustrated in Fig. 8.

★ ★ ★

The influence of these losses on the characteristic of the drive is the major reason why it is seldom good practice to apply a torque regulated reel drive for fine wire at high speed. Here most of the motor power is required for friction and windage losses. For light materials at high speed the reel drive should establish the linear speed, or a dancer roll control should be used.

Starting and Stopping

After it has been determined that a torque motor will meet the running requirements of a drive, the starting and stopping performance should be investigated. Normally, successful acceleration and deceleration will be obtained if the drive meets the following conditions.

1. **Sufficient slack does not develop to cause a tangle or snarl**

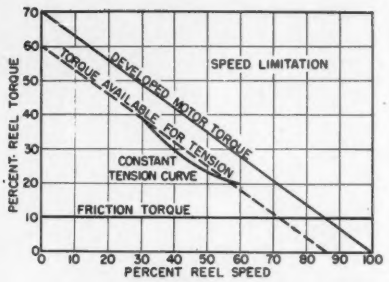
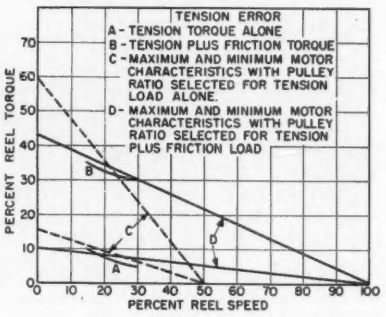


FIG. 8


TENSION ERROR
A - TENSION TORQUE ALONE
B - TENSION PLUS FRICTION TORQUE
C - MAXIMUM AND MINIMUM MOTOR CHARACTERISTICS WITH PULLEY RATIO SELECTED FOR TENSION LOAD ALONE.
D - MAXIMUM AND MINIMUM MOTOR CHARACTERISTICS WITH PULLEY RATIO SELECTED FOR TENSION PLUS FRICTION LOAD
PERCENT REEL TORQUE
PERCENT REEL SPEED
0 10 20 30 40 50 60 70 80 90 100
A
B
C
D

EFFECT OF FRICTION LOSSES

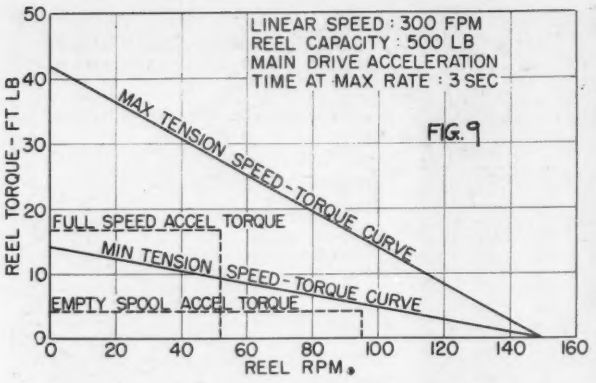
2. **The tension does not become high enough to stretch or break the strip**

★ ★ ★

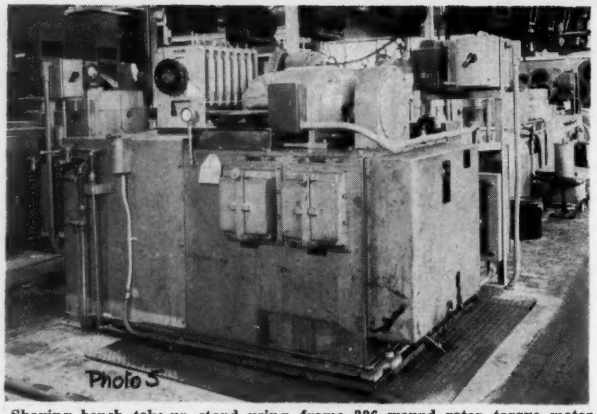
Starting and stopping will seldom be a problem when the linear strip speed is less than 200 or 300 fpm. Material processed at these low speeds is usually quite large, and normal running tension torque will be adequate to accelerate the reel without allowing appreciable slack to develop. On stopping the material will have adequate strength to decelerate the reel without developing excessive tension. When fine wire is processed at low speed as is the case on enameling lines, the wire will be allowed to slip during starting and stopping.

★ ★ ★

In Fig. 9 it will be seen that the reel drive has sufficient torque to accelerate an empty reel even when set for minimum tension, although the tension may vary from over twice the desired tension to almost zero tension during the starting period. However, the tension variation is seldom of any consequence during the brief accelerating period so long as it does not stretch or break the strip. If tension variation must be held to a minimum, the operator can manually adjust the tension rheostat while the drive is accelerating. See Photo 5.



ACCELERATION PERFORMANCE



Shaving bench take-up stand using frame 326 wound rotor torque motor for up to 0.625" diameter copper wire at 120 fpm and less. * * *

Control Required

Selection of control for torque motors is quite simple. When using standard, listed motors, open or blower ventilated, the primary and secondary data listed in the manufacturer's handbook will apply. When using special design torque motors this data must be obtained from the manufacturer.

* * *

It is usually most convenient to use edgewise wound, non-breakable resistors for the fixed section of the secondary resistance. These resistors are light weight, are available with standard mounting frames and perforated, protective covers, and can easily be equipped with several taps. The resistors will be selected to establish the maximum speed-torque curve on which the motor may operate. Because of manufacturing tolerances and internal motor resistance drop, it is good practice to specify slightly higher resistance than is theoretically required with several taps to allow adjustment during installation. Generally, the resistor current capacity will be based on the stalled torque point of the maximum speed-torque curves. On larger drives, this practice may be costly, and the resistor will only have a current rating corresponding to the maximum running torque required.

* * *

Plate type rheostats are most suitable for the adjustable section of the secondary resistance. They have excellent heat dissipating ability, can be supplied in a wide range of resistance values, and are easily adopted for three phase connection using three plate or six plate tandem assemblies. They provide up to 70 steps of adjustment, and the cost may be determined from the manufacturers' handbook. Tables I and II may be used to select the required size and number of plates.

* * *

When the required rheostat rating exceeds the capacity of plate type rheostat, a drum switch may be used. The drum switch resistor should be designed with balance resistance on the first point and minimum unbalance on each succeeding point. The unbalanced resistance points, that cannot be avoided when using a drum switch, do not adversely affect the drive. The drum switch is available in any practical capacity, but it does have the disadvantage of allowing only ten steps of torque adjustment.

* * *

A motor starter may be selected by using the following formula:

* * *

$$\frac{\text{Torque (Fig. 4) x synchronous rpm}}{5250} = \text{horsepower}$$

TABLE I

Maximum HP capacity of IC 8070 and IC 8000 Plate Type rheostats used for torquemotor control.

Ratio of max. to min. motor torque required at any given speed.	*HP capacity (using six 12" plates)
2:1	12
3:1	8
4:1	7
5:1	6.5
6:1	6.0
10:1	5.5

$$*HP = \frac{\text{Wire tension (lbs)} \times \text{Wire speed (FPM)}}{33000}$$

TABLE II

Continuous Capacity of IC 8000 and IC 8070 Plate Type Rheostats

Plate size	No. of plates	Max. Amps.	*Watts	No. of Steps
6	3	25	900	27
9	3	25	1800	52
9	6	40	3600	52
12	3	25	3000	70
12	6	40	6000	70

* Calculate from following formula:

$\text{Watts} = (\text{Amps}_{\text{Max.}})(\text{Amps.}_{\text{Min.}})(\text{Ohms})(3)$

Where : $(\text{Amps.}_{\text{Max.}}$ = Amperes per leg with rheostat resistance all out.

$\text{Amps.}_{\text{Min.}}$ = Amperes per leg with rheostat resistance all in.

Ohms = Rheostat ohms per leg.

Using this horsepower, select a standard starter of the required voltage rating.

Overload heaters should be selected on the same basis. See Photo 6.

High Speed Applications

Although this discussion has been primarily concerned with low horsepower applications at low, linear speed, it should not be inferred that torque motors are strictly limited to these conditions. Torque motors have been used to reel copper wire as small as 0.052 inch diameter at speeds of 4,000 fpm, and steel wire 0.015 inch diameter at 1200 rpm. They have also been used up to twenty-five (tension) horsepower.

★ ★ ★

One precaution, mentioned earlier, must be very carefully observed in applying any type of torque regulated reel drive at high speeds. Windage losses may become quite large, and if light tension is necessary, it may not be possible to retain effective tension control without a dancer roll.

★ ★ ★

Some modifications of the basic torque motor system that may be used to extend the range of application include: (See Photo 7)

Acceleration

1. **Allow slippage at the main machine during starting. This technique has been successfully used on both copper and steel wire drawing machines.**
2. **Manual forcing—when acceptable to the user, the operator may adjust the tension control rheostat during acceleration to synchronize the main and reel drives.**
3. **Automatic forcing — a contactor may be used to short out part of the reel motor secondary resistance during the starting cycle to obtain increased torque.**

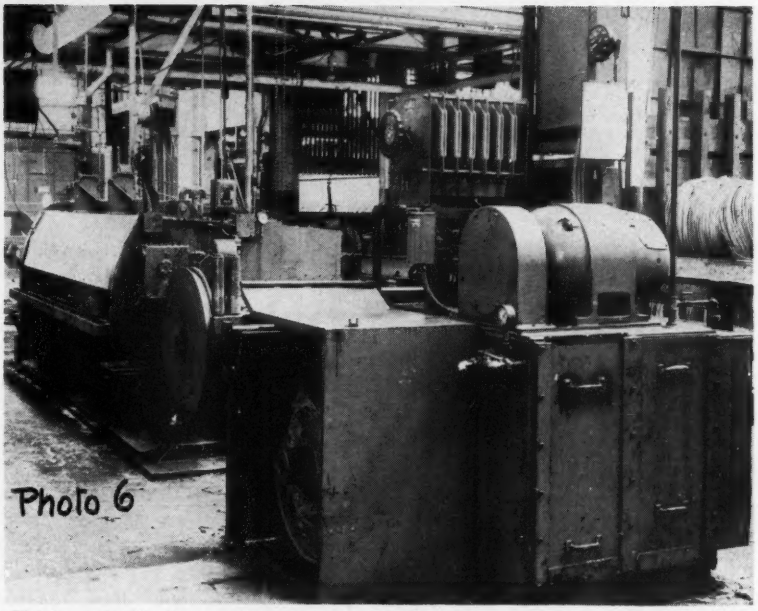
Increased Capacity

1. **Forced ventilation—wound rotor motors may be used up to their normal rated torque capacity down to 5% rated speed when provided with a suitable blower and enclosure.**

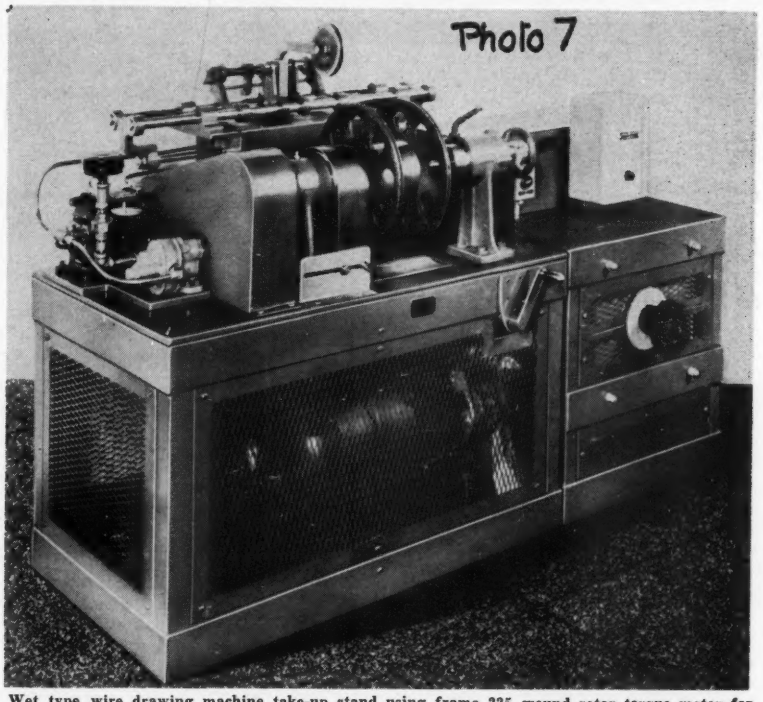
Deceleration

1. **Mechanical braking of the reel drive—electrically set brakes are available in which the torque may be easily adjusted over a wide range by means of a rheostat. Thus the braking torque necessary to stop the reel in step with the main machine may easily be selected.**
2. **Allow slippage at the main machine during stopping—braking may be applied to the reel while the main drive is still running, and the main drive de-energized after a time delay to allow both sections to stop at about the same time.**

(See Photo 8)



Wet type wire drawing machine take-up stand using frame 324 wound rotor torque motor for #6 to #14 AWG copper wire at 3100 fpm and less.



Wet type wire drawing machine take-up stand using frame 225 wound rotor torque motor for .015" diameter steel wire at 1200 fpm.

High Quality, Low Investment

Torque motors offer many substantial advantages over mechani-

(*Please turn to page* 217)

Coulter & McKenzie

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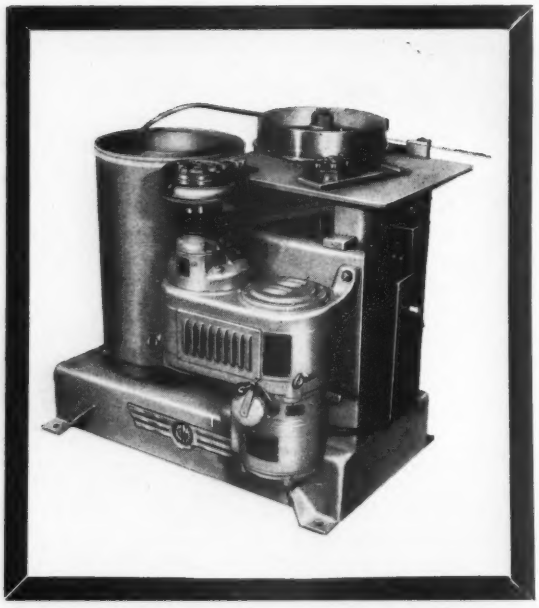

MULTIPLE BLOCK INSTALLATIONS ARE AVAILABLE FOR PATENTING, TINNING TAKE-UP, ENAMELING, AND RESPOOLING OF MATERIALS FROM HIGH CARBON TO SOFT COPPER.

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MODEL 227 — For use with drums having a capacity from 50 to 200 lbs. This DRAW-PAKing equipment is designed for one shift production and/or to suit existing plant space and handling. Drum sizes from 11" dia. x 11" — 20¾" ht.

MODEL 127 — For use with drums having a capacity from 500 to 750 lbs. Provides the maximum unit package size which may be conveniently handled by mechanical means. Drum size 20" dia. x 30" ht. and 23" dia x 33" ht.

Low cost wire packaging attachments are available. When writing, kindly furnish information on proposed application, and specifications of existing equipment and floor space.

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Progress in "Koldwelding"

by W. A. Barnes, Vice President
Engineering and Product Development
Utica Drop Forge and Tool Company
Utica, New York

The author's company has spent large sums of money in developing tools for the cold welding of metals and have built and discussed many, many models of tools, before making the present types available to the metal working trades. In this work of development, the applications of cold welding has been broadened considerably and in this article Mr. Barnes brings our readers up-to-date on how and where this interesting process may be utilized successfully.

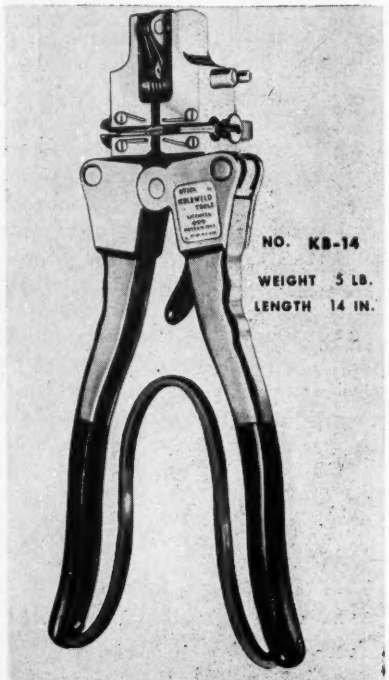
Much progress has been made in industrial applications of cold welding since the appearance of my paper on the subject in the July, 1953, issue of Wire and Wire Products.

★ ★ ★

Our company has completed the development of hand tools for the butt-welding of wire and the lap-welding of foil sheet and small wires as well as the sealing of copper and aluminum tubing. These tools are now available with reasonable time allowance for making up the special dies usually required.

★ ★ ★

The new cold welding tools are being used in daily production by a number of large copper and aluminum wire and cable producers. Buttwelds which require very little finishing effort to prepare for pullng thru wire drawing dies are the expected and experienced result of the use of these butt-weld tools. Wires cold buttwelded in the finished sizes are being spun into cables and run thru continuous vulcanizers. Cold welding is also being used in wire mills to join together odd lengths of wire to reduce scrap losses.



KOLDWELD tool for butt-welding wire

★ ★ ★

Very dependable results are secured with these tools on all coppers and on all aluminum alloys, except for those in the T temper and 56-S grades. However, 56-S aluminum alloy is cold-welded in the O temper. Some difficulty has been experienced in obtaining uniformity of results in 56-S and this type of welding is not recommended as practicable for the harder tempers at the present time. Nevertheless, work is being continued on these alloys with promising results in view.

★ ★ ★

Any of the copper tempers from dead soft to hard drawn are weldable by this process and the EC aluminums, including 2S, 3S, in any temper.

★ ★ ★

Industry experience has shown a preference for the closely aligned buttweld with insignificant flash scars which is obtainable only by cold welding and that, in turn, has made it necessary to restrict the range of wire sizes weldable in any one set of dies. It is possible to obtain good strong welds between wires considerably larger in diameter than the groove size of the gripping dies. This, however, results in a side flash projection from the surface of the wire opposite the parting line in the dies which increases the labor of finishing the weld. If dies of exact size are used, the side flash can be completely eliminated on all harder wires and made insignificant on softer wires. The circular flash surrounding the weld itself has by careful die design been made so thin at the point of attachment to the wire that it is easily removed with a small pair of flush edge diagonal pliers. In some small diameter wires, this circular flash can be removed with the fingers and even in 3/8" diameter rod, it is easily removed in a matter of three of four seconds with a 6" pair of pliers.

★ ★ ★

We have found no inherent reason in this process to limit the size of material that can be welded. Very small wires to very large rods and very thin foils to very thick plates can be cold welded successful with equal facility, once the mechanical limitations of accuracy in the tools, metal flow and application of suitable force are solved.

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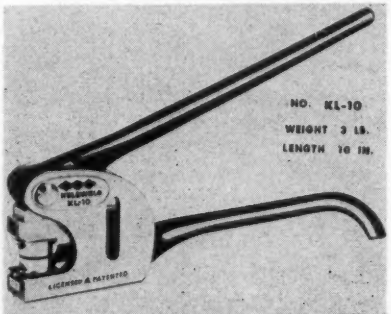

KOLDWELD tool for lap-welding sheet

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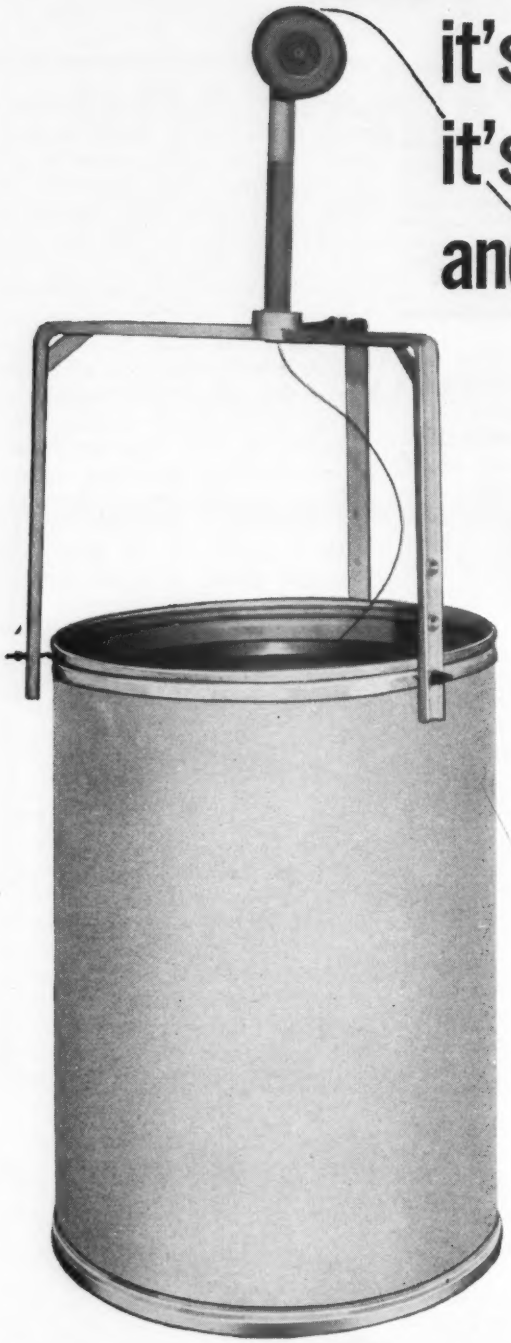

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SAVES TIME—Payoffpak can hold 600 lbs. Downtime on the wire drawing machine, due to stripping operations, is greatly reduced.

ELIMINATES REELS—Single standard-size Payoffpak eliminates reels and need for wide range of block sizes.

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A survey indicates that often more than 50 labor steps are needed to convert 500 pounds of steel wire in standard eight inch coils—but you can do the same job with Payoffpaks in an average of five operations. No wonder they are calling this new container "the long-playing record of the wire industry" See how Payoffpaks can pay off for you. Call Continental for complete information on this exciting new way to package, handle and dispense wire.

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Fatigue Life of Stranded Hook-Up Wire

by Donald C. Alexander
Chief Engineer
Surprenant Mfg. Company
Clinton, Massachusetts

A paper delivered by the author on December 14, 1953, at the Signal Corps Wire and Cable Symposium in Asbury Park, N. J. It is published by the courtesy and with the permission of Mr. Alexander.

Increasing use of electronic equipment in both ground vehicles and aircraft has caused many new problems in the hook-up wire field. Especially is this true in aircraft equipment, where size and weight reduction are of increasing importance. The resultant trend toward miniaturization requires physically smaller wires and cables wherever electrical considerations will permit. Here many circuits employ practically infinitesimal currents so that the factor determining conductor size usually becomes simply mechanical strength. Extremely difficult environmental conditions are also frequently encountered, and equipments must be operable over wide temperature ranges and under conditions of severe mechanical abuse.

★ ★ ★

Since this mechanical abuse often takes the form of fatigue induced by vibration, completed equipments must be subjected to vibration tests before acceptance by the Armed Services. Consequently, it has been proposed that individual components should be subjected to similar tests before they are accepted for use in completed equipments. Such tests have been considered from time to time for wire and cable specifications. Unfortunately since the resonance frequencies and amplitudes of vibration are dependent upon terminations and fastening techniques used, a vibration test on the wire itself will mean very little unless the precise manner in which the wire or cable is to be installed in service is used during the vibration test.

★ ★ ★

Hook-up wires are exposed to three types of fatigue: (1) vibration; (2) sharp bending during installation, modification, and servicing; and (3) intentional flexing in service. As stated, vibration is very difficult to simulate in the laboratory. The second type, sharp installation-bending, is also difficult to reproduce because each installation and each installing activity have different wiring problems and technicians servicing equipment in the field subject the wires to varying degrees of abuse. When, as in the third case, a cable is required for flexing service, the application is usually known in advance so that laboratory procedures may be established which will accurately simulate the service use. In order to make laboratory studies of vibration and installation difficulties some sort of bending techniques must be resorted to in an attempt to evaluate the relative merits of wires and to compare constructions, materials, and installation techniques.

★ ★ ★

Since Surprenant Mfg. Co. specializes in wire and cable for this type of service, it has been necessary to resolve innumerable problems of this sort, and this paper presents experimental data obtained for the purpose of solving such problems. It should be borne in mind that these data were taken at several different times for individual problems so that test conditions vary widely from one test to another. The variables which enter into the picture are so numerous that it is not possible in some cases to correlate the data among the different tests. But because the results as presented here are averages of several different readings which were very consistent among themselves, the data does give good comparisons based on individual tests. The data appear to be quite reliable horizontally provided the test conditions are kept in mind. Some of the variables which can enter into the picture have already been mentioned, i.e., whether the bending is due to vibration, intentional sharp bending, or loose flexing. Other factors include: the wire size and stranding, conductor material, the type of insulation, and the method of termination. The last mentioned includes a number of variables depending on whether the wires are soldered or crimped, the type of lug used, whether the insulation is supported at the lug or not and how the wire is fastened to the equipment itself.

★ ★ ★

The equipment used for making the tests are shown in figures 1 through 5. In figures 1, 3, and 4 the motion consists of a longitudinal oscillation of the bar in the foreground of the picture of one inch at approximately twelve complete cycles per second. A counter on the same shaft as the crank records the number of complete cycles during the test. In the tests illustrated in these three figures the remainder of the apparatus to the right is either unused or used only as a vise to hold the test specimen.

★ ★ ★

In figure 2 the oscillating bar is not used. The pinion shaft to which the wire specimen is attached oscillates at a rate of approximately 1½ cycles per second, producing a sharp bend in the wire at the point of attachment. The wire specimen is placed under the desired tension by the spring in the extreme foreground. The crank throw can be adjusted to obtain any desired angular oscillation of

the pinion shaft.

★ ★ ★

In figure 5 a 1725 rpm motor drives a 100 to 1 gear reduction by means of pulleys and belt. The gear reduction in turn drives a crank, connecting rod, rack, and pinion to oscillate the long arm in angular fashion through any desired angle between plus and minus 45° and plus and minus 90° by adjusting the crank throw. The number of complete oscillations are recorded on the counter at the extreme right.

★ ★ ★

The apparatus shown in figures 1 and 5 are used to simulate applications where bending is deliberate and controllable in practice. The severity of the bend can be varied in figure 1 by the size of the post used. In figure 5 the bend may be varied by the size of the two mandrels between which the wire passes and by the amount of weight hung on the conductors.

★ ★ ★

The arrangement as shown in figure 2 is used to produce sharp bending such as would be encountered in moving harnesses about during installation or servicing. Several tests reported later in the paper also accomplished this type of bending by hand over the edges of a vise. In an attempt to simulate vibratory conditions, the apparatus arranged as shown in figures 3 and 4 is used. Vibration of wires or wire harnesses attached to terminals usually results in a sharp bend of a small angle. In figure 3 such a bend is produced at the point of clamping to the oscillating bar. For comparison purposes and to produce the same bend from sample to sample a known length of wire is clamped at the same point each time in the oscillating bar and the stationary piece at the right of the picture. In figure 4 the bend is produced by clamping the wire at right angles to the oscillating bar and passing it between two vertical pins located a fixed distance away from the bar as shown. The test specimen passes over a sheave and has a known weight attached. For most of the tests, the pins were located an inch and a half from the leading edge

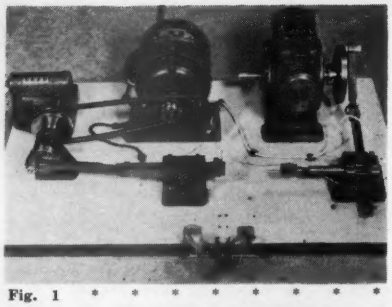


Fig. 1

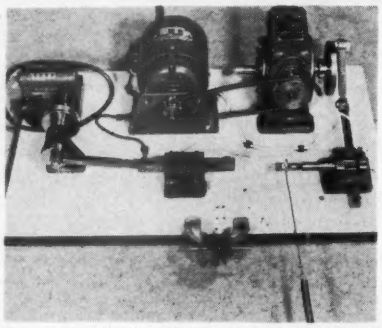


Fig. 2

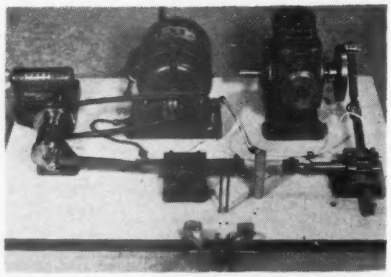


Fig. 3

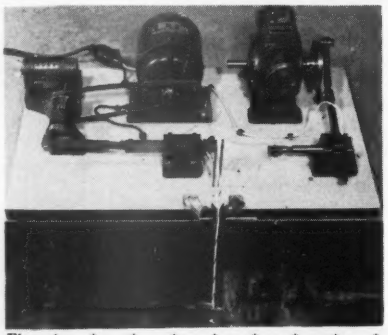


Fig. 4

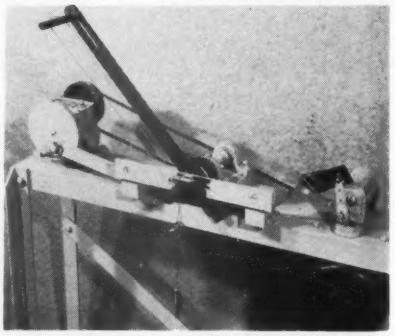


Fig. 5—Rotating Bar Machine.

of the oscillating bar. This test gave results which were slightly more reproducible than the tests shown in figure 3, so that the majority of the results reported in this paper, where an attempt was made to represent vibrating conditions, were obtained by the test method indicated in figure 4.

★ ★ ★

In all of the testing, the conductor under test forms a part of the circuit operating the drive motor so that failure of the wire stops the equipment leaving the number of cycles recorded on the counter. For the sharp bending as conducted in figure 2 and for those tests done by hand the cycles were counted since very few cycles were required.

★ ★ ★

The use of aluminum wire has been attractive to aircraft manufacturers since for a given current carrying capacity a saving in conductor weight of about one-half may be achieved. Aluminum has been used in large power cables in several airplanes and consideration has been given to the use of this material for smaller size interconnecting wire. The weight saving here could be considerable when one considers that some types of aircraft have as much as 250 pounds of #20 wire alone. With this in mind, studies were made to evaluate the possibility of using aluminum wire in place of copper. Of course a primary requirement for aircraft wire is its fatigue life under conditions of vibration. Since aluminum is extremely difficult to solder properly the problem of terminations was looked into at the same time.

★ ★ ★

Four types of crimp terminals were used in comparing aluminum with copper as shown in figure 6.

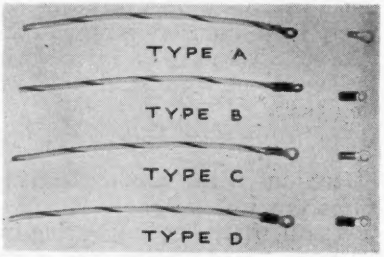


Fig. 6—Terminal Types.

Type A has a short metal sleeve in which the stripped conductor is inserted and a pressure joint is formed by crimping the terminal with a special tool. The type B terminal is similar to type A except that a semi-flexible insulating sleeve extends back over the insulation so as to help relieve the strain appearing at the point where the insulation is stripped from the conductor. The type C terminal has a longer metal sleeve so that the insulation may be inserted into it a short distance and the joint made as before. The type D lug is built exactly like type C except that the metal sleeve has insulation over it. As expected the data which follows shows that there is no significant difference between types C and D connectors.

★ ★ ★

In all of the tests conducted, tinned or silver plated soft drawn copper wire was used as a control for comparison purposes and serves as a basis for drawing conclusions between various tests.

★ ★ ★

For the aluminum comparisons, a #20 AWG wire made up of seven strands of #28 insulated with a vinyl insulation (Surprenant Mfg. Co., B-2 formulation) with an outside diameter of .075″ was used. In addition to the soft tinned copper, electrical conductor grade aluminum (ECH-19) and an aluminum alloy (56-S) were tested. The 56-S grade of aluminum is a high tensile strength aluminum alloy used for metallic braids and armors in the cable industry. This test was conducted using the technique shown in figure 4, since it was desired to simulate the effects of vibration. The two pins were located one and one-half inches from the leading edge of the oscillating bar. The results are summarized in table I.

★ ★ ★

An examination of these data brings out several interesting ideas. The uninsulated wire stood up much better than the wire with the insulation stripped back beyond the connector sleeve. This was expected since the insulation serves to stiffen the wire and produce a hinging action between the insulation and connector which gives a more severe bend than that obtained in the uninsulated wire.

TABLE I

(All numerical values are test cycles)

Connector Type A	Copper	56-S	ECH-19
Uninsulated wire	3710	7387	260
Insulation clear of connector	1614	4098	177
Connector Type B			
Uninsulated wire	8945	20643	1877
Insulation clear of connector	11004	14129	1274
Insulation inside connector	10354	20203	2093
Connector Type C			
Uninsulated wire	5583	8770	525
Insulation clear of connector	3724	5496	479
Insulation inside connector	1902	4074	403
Connector Type D			
Uninsulated wire	5687	11552	632
Insulation clear of connector	4075	3571	686
Insulation inside connector	2405	4844	402

★ ★ ★

There is no significant difference in the behavior of connectors C and D.

★ ★ ★

Connector type A consistently made the poorest showing. This terminal had no sleeve for insulation support, hence, all connections were made with the wire insulation clear of the connector.

Connector type B is far superior to any of the other types since the insulating bushing is semi-flexible and acts to cushion the bends. This effect is especially noticeable when the insulation extends inside the sleeve.

★ ★ ★

Comparison of materials definitely shows that the electrical conductor grade aluminum would not be suitable in hook-up wire sizes for an application where vibration is a problem. The aluminum alloy appears in every case to be consider-

TABLE II

(All numerical values are test cycles)

	Connector Type			
A. Crimped Connection	A	B	C	D
1. Uninsulated	1728	2817	2611	2258
2. Vinyl Insulation Only				
Insulation clear of connector	630	2360	1281	702
Insulation inside connector		2416	1206	1304
3. Vinyl Insulation With Nylon Jacket				
Insulation clear of connector	557	2053	950	467
Insulation inside connector		2462	1038	896
B. Soldered Connection				
1. Uninsulated	1655	1911	1785	2167
2. Vinyl Insulation Only				
Insulation clear of connector	594	723	300	588
Insulation inside connector		3216	2050	3007
3. Vinyl Insulation With Nylon Jacket				
Insulation clear of connector	377	1501	536	433
Insulation inside connector		3716	1313	1664

ably better than the soft copper, however, the conductivity is only 29% that of copper so that for the same current carrying capacity, no weight saving is had in the conductor itself. Therefore, the conductor would be larger and bulkier and would require more insulation so that the finished wire would be heavier than the equivalent copper conductor.

★ ★ ★

Further work was done with the same connectors with copper wire only, to try to determine the effect of soldering with the various types of lugs. A soldered connection in the type A lug is very similar to a connection soldered to a pin, tube socket, potentiometer, etc.

★ ★ ★

Exact comparison cannot be made with the data shown in table I since in this test seven strands of #26 (#18 AWG) tinned copper were used with a vinyl insulation and vinyl insulation with nylon jacket, as well as uninsulated conductor.

★ ★ ★

Table II once more clearly shows the superiority of the type B connector with the type A connector again giving the poorest results. Type C and D connectors show very little difference in their behavior and lie between A and B in their performance.

★ ★ ★

An unexpected result was obtained in every case where the insulation was supported inside the sleeve. In this instance the soldered connections gave noticeably better fatigue life than the crimped fastening. The reason for this is that the solder stiffens the conductor to such an extent that the bending occurred back in the insulated part of the conductor away from the connector itself. When the insulation was not supported however, the exact reverse was true because the bending still took place where the conductor was exposed and the solder had run back, fusing the strands together and making in effect a solid wire.

★ ★ ★

On the average it appears that the nylon jacket has very little

TABLE III

	Copper	Aluminum 56-S	Ratio
#28 Solid	6118	8192	1.32
#20 (7/28)	10239	17552	1.71
	Copper	**Cadmium Bronze**	
#35 Solid	11009	35007	3.19
#27 (7/35)	14587	45513	3.12

TABLE IV

	Copper	Aluminum 56-S	Ratio
#28 Solid	6.5	2.6	.40
#20 (7/28)	14.3	6.6	.46
	Copper	**Cadmium Bronze**	
#35 Solid	8.0	3.6	.45
#27 (7/35)	21.6	8.1	.38

TABLE V

	Copper	Aluminum 56-S	Ratio
#28 Solid	7	3.4	.49
#20 (7/28)	58	18.8	.32
	Copper	**Cadmium Bronze**	
#35 Solid	4	2.6	.65
#27 (7/35)	17	13.4	.79

TABLE VI

	Copper	Aluminum 56-S	Ratio
#28 Solid	571	477	.84
#20 (7/28)	1042	828	.80
	Copper	**Cadmium Bronze**	
#35 Solid	3116	17722	5.7
#27 (7/35)	3595	9311	2.5

TABLE VII

	Copper	Cadmium Bronze	Beryllium Copper	Copperweld
Insulation less than 1/64" from terminal	27	263	1294	3040
Insulation ¼" from terminal	104	952	3671	8745

TABLE VIII

	Copper	Cadmium Bronze	Beryllium Copper	Copperweld
Sharp Angle Bend	8	3	13	30

TABLE IX

7 strands of #26	351
19 strands of #30	874
65 strands of #36	2892
105 strands of #38	2908

effect on the performance of the wire. Again in this series of tests the uninsulated wire stood up better than the insulated wire. The variation between individual readings was somewhat greater for the soldered connections than for the crimped connections.

★ ★ ★

A third series of tests were run on bare copper, 56-S grade aluminum, and cadmium bronze. These tests were conducted for specific purposes so that the wire sizes are not the same for the aluminum and the cadmium bronze, however, in both cases a copper conductor identical to the corresponding aluminum and cadmium bronze were tested. In order to evaluate the relative merits of cadmium bronze versus the aluminum alloy a ratio of aluminum to copper and cadmium bronze to copper was calculated for each case.

★ ★ ★

Table III shows the results of a deliberate flexing tested as shown in figure 1. For the larger wires, that is, #28 and #20 a ½" post was used. When the #35 and #27 wires were tested, it was found that the ½" post would give well over 100,000 cycles before failure so that the post diameter was reduced to ¼" to give a sharper bend to the wire to obtain a reasonable test time. Table III shows comparisons of the data taken in this fashion. Again the high tensile aluminum alloy shows up somewhat better than the annealed copper and the cadmium bronze is far better for this type of flex.

★ ★ ★

Several tests were made giving conductors sharp bends such as would be experienced in moving harnesses about during installation or servicing. Data shown in table IV represents a total bend of 180° obtained by application of hand pressure at the bending point. The wire was held in a small vise and bent 90° to the right and 90° to the left. These data very clearly show the advantage of copper over the higher tensile strength materials for this type of bend.

The apparatus shown in figure 2 was used to obtain the data in table V. The wire strand was clamped as shown to the rotating member and placed under about two ounces of spring tension. The shaft was then rotated about 90° in each direction. The low spring tension provided a less severe bend than the manual bending. In every case and particularly in the case of the #20 wire the stiffness was great enough to produce a longer sweeping bend requiring more bends to fail the wire. This gives the stiff #20 aluminum wire a noticeable advantage.

★ ★ ★

In order to simulate a sharp bend through a small angle the apparatus in figure 3 was used. This test gave a small angle but a rather sharp bend directly at the point of clamping and all failures occurred at this point. Reference to table VI will show the results here. These indicate a degree of bending lying between the test results shown in table III and table IV. The #35 solid appears to give the cadmium bronze an abnormally high advantage and should be viewed with suspicion.

★ ★ ★

A few tests were conducted to obtain some quick comparisons with other materials. The method used here is that shown in figure 4 using terminal type A soldered with a thirteen ounce weight hung on the conductor. All conductors in this test were silver plated. The wire used consisted of 19 strands of #36 conductor with a monochlorotrifluoroethylene insulation having an outside diameter of .046". These tests were done with the insulation brought up to within 1/64" of the terminal sleeve and repeated with the insulation about a ¼" away from the sleeve as shown in table VII. It is apparent from these figures that longer life is obtained when the insulation is stripped back somewhat from the connector if a soldered joint is used. This result is expected since this type of insulation is quite stiff and the solder runs back slightly under the insulation when the insulation is very close resulting in a solid wire where the bending takes place. The solder did not run back ¼" so that in the second instances the flexing occurred in a part of the conductor where the strands were not bonded together. The data indicates for this type of bending that copperweld is far superior to other materials with beryllium copper much better than cadmium bronze or soft annealed copper. Further work remains to be done here with other type of insulation. Because of the inherent stiffness of the material used for these tests it may well be that the extra stiff conductors give a misleading comparison.

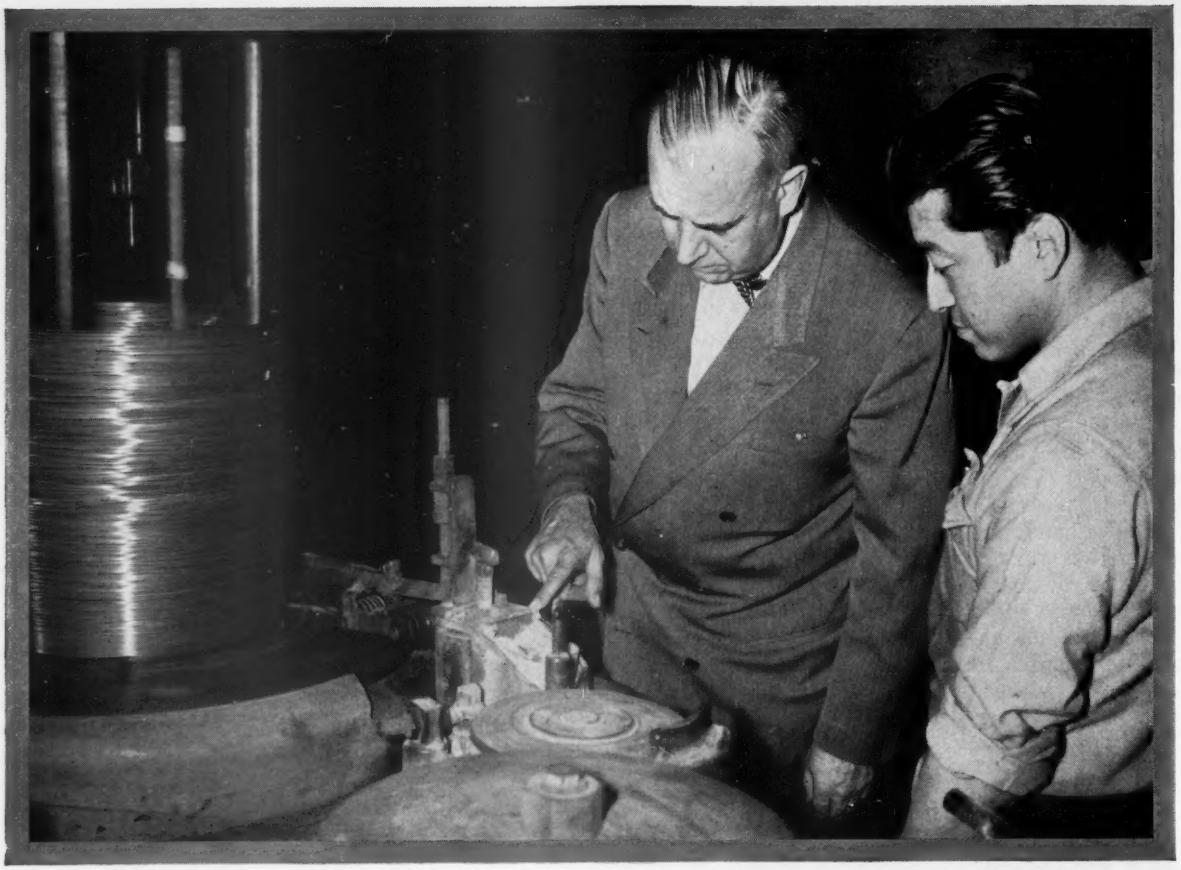
★ ★ ★

Since these tests show copperweld and beryllium copper in such a favorable light, further tests were conducted on the same four metals by bending them through a sharp angle of plus and minus 90° by hand. The data as shown in table VIII again shows beryllium copper and copperweld superior to the other two metals. Comparison of the copper and cadmium bronze figures with those shown in table IV shows the reproducibility of this type of test rather clearly. The fact that an average number of flexes is almost the same for the two cases is not significant because one was conducted with #35 solid wire and the other conducted with 19 strands of #36; but the fact that the ratio between the copper and cadmium bronze is almost the same tends to lend confidence in the experimental work since the data were taken at two widely separate intervals by different observers.

★ ★ ★

Work is presently being carried on to determine the optimum number of strands and lay length for hook-up wires in regard to bending life. The equipment being used for this series of tests is shown in figure 5, one cycle consisting of a 90° bend in each direction. The work which has been done used #18 AWG wire with the following strandings: 7 of #26, 19 of #30, 65 of #36, and 105 of #38 tinned copper with a vinyl insulation (Surprenant Mfg. Co., formulation B-2) with an outside diameter of approximately .078". The results are shown in table IX.

(*Please turn to page* 221)



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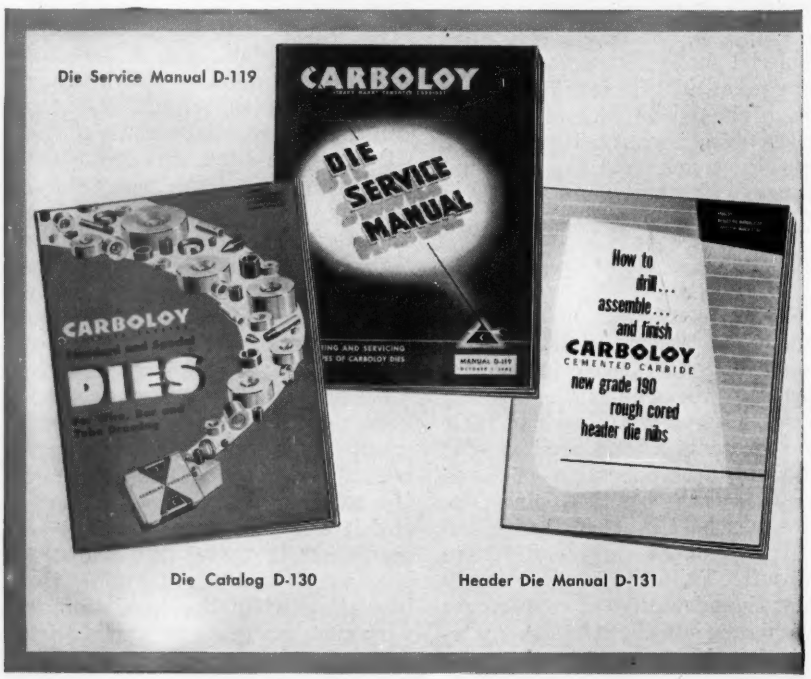
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Versatile Wire Annealing Furnace

by Robert W. Campbell
Head, Special Services Section
Atomic Energy Division
Sylvania Electric Products, Inc.
Bayside, N. Y.

In this article the author describes a furnace developed in connection with work his company did under AEC Contract AT-30-1 Gen. 366, by which six wires could be continuously annealed simultaneously.

During the course of a development program involving wire drawing, it became apparent that certain wires had to be bright annealed after each drawing pass. These wires were drawn from an initial diameter of 0.250″ to a final diameter of 0.020″. In most cases several wires were drawn as a unit. Reductions were of 5% increments, this necessitating a considerable number of passes and subsequent anneals. The annealing temperatures were in the 1200°C range.

★ ★ ★

To anneal these wires individually was an enormous task even though feed and take-up reels were used to pull the wires through the wire annealing furnace. Attempts were made to anneal all these wires at one time, however, constant attention by at least two persons was required to keep them from becoming tangled and fusing together during the process. Attempts were also made to anneal these wires by spooling on a small reel and placing in a batch type furnace. This resulted in coils seizing to each other, thus creating an undesirable surface for further drawing.

★ ★ ★

As a result of this, a furnace (described below) was designed to allow for the annealing of a maximum of six wires simultaneously, without the danger of contact by any of these with each other. One wire may be drawn at a time as well, and the other available portions cut off, thereby not wasting the protective atmosphere.

★ ★ ★

A single tube nichrome-wound wire annealing furnace, capable of attaining approximately 1100°C, and which could be supplied with any of several protective atmospheres, was used as the basis. Each end of the tube was open, with flame curtains at both ends. In addition to the danger of the wire entangling, the flame curtain at the exit end tended to oxidize the wire as it passed through. An alternate method of effectively sealing the tube was required.

★ ★ ★

The furnace body (C, on Fig. 1) was revamped by removal of the tube and heating element and insertion of a standard Hevi-Duty Alloy #10 element approximately three inches i.d. and three feet long. This element was actually a spare for a Type HDT 1736 wire annealing furnace currently in operation with a single tube. A 5 kva dry transformer was used to provide the necessary power for the heating element. This transformer produced 65 volts and 2.5 kv at the secondary terminals. This combination permits the furnace to operate continuously at a temperature of 1260°C.

★ ★ ★

A glazed quartz tube (B), 2½ inches o. d. and 1⅞ inch i. d., was used as an open end muffle passing through the heating element and extending about four inches beyond each end of the furnace box itself. Through this tube were inserted six ½ inch o. d. and ⅜ inch i. d. Inconel tubes (A). At the exit end of the furnace these tubes were threaded into six closely spaced holes drilled and tapped through from flat face to flat face into a gas inlet ring (D), 3 inches in diameter and 1½ inches thick.

(*Please turn to page* 214)

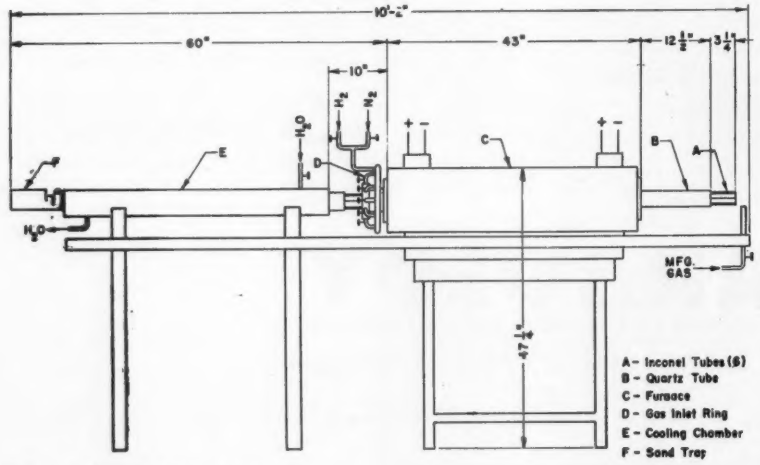
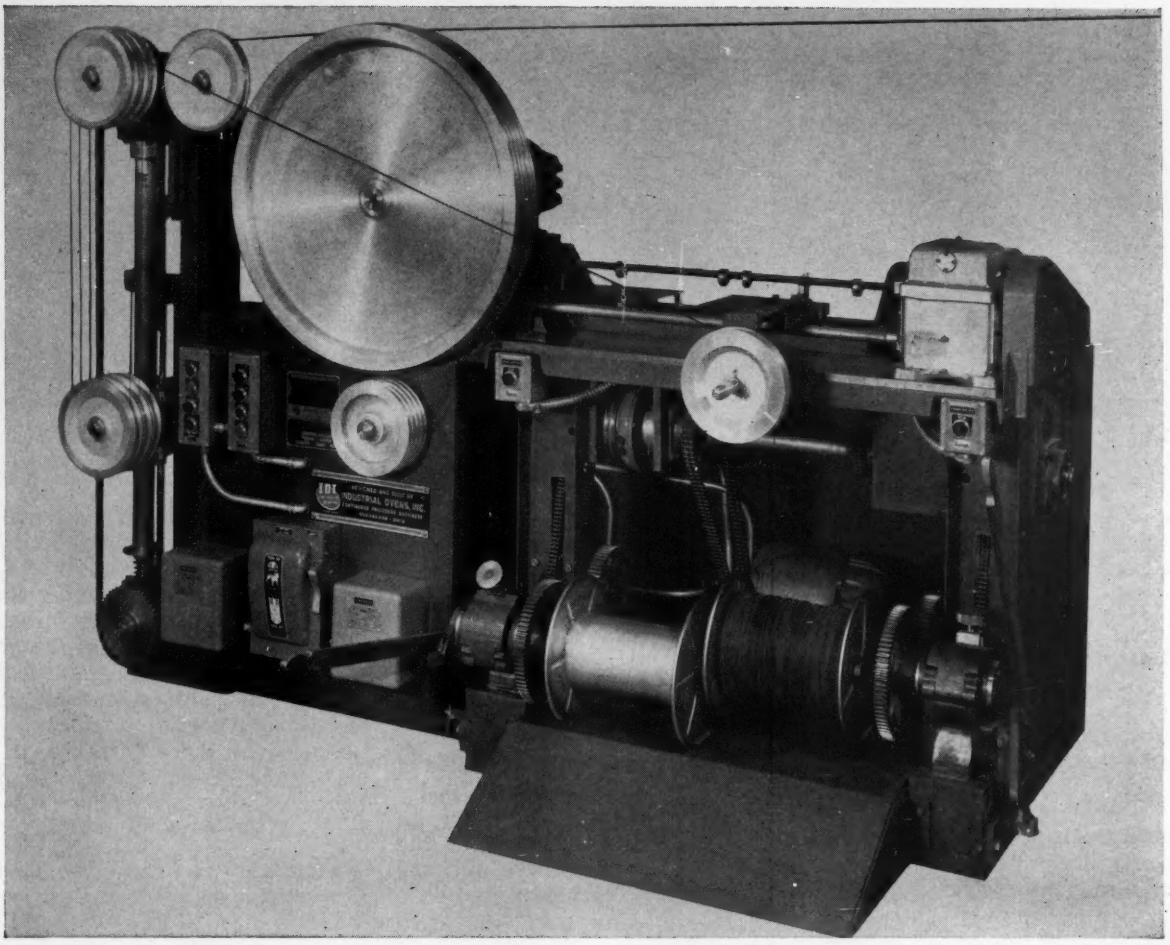


Figure 1: Overall sketch of furnace.



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Bethlehem Pacific Completes Steel Plant Modernization Providing Coast with Fully Integrated Wire Mill

by John W. Egan
Manager, Wire Product Sales
Bethlehem Pacific Coast Steel Corporation
Los Angeles, California

Plans started ten years ago to enlarge and broaden this West Coast Steel Company's operations were recently completed. What Bethlehem has done at Los Angeles is described in this article.

From gleaming new modern kitchens to dusty hay fields, wire today is playing an increasingly important role in practically every industry in helping create even higher living standards for all of us.

★ ★ ★

But kitchen utensils and spools of wire for automatic hay bailing machines are only a short step removed from the bubbling cauldron of new-born steel.

★ ★ ★

And the more efficient that production step in the making of steel, the shorter in time, the more benefit it has upon the successful production of wire of all sizes and metallurgical makeup.

★ ★ ★

At the Los Angeles plant of Bethlehem Pacific Coast Steel Corporation, production of steel in electric-arc furnaces from selected steel scrap, and subsequent rolling facilities have been so improved within the last decade that the Bethlehem Pacific Los Angeles Wire Mill now has behind it one of the most modern and efficient steel-making plants in the country. Additional laboratory facilities have been added, including latest spectrographic equipment for more precise quality control.

★ ★ ★

Since the close of World War II, the Los Angeles plant has been completely rebuilt, giving the mushrooming industrial community of Southern California, in effect, a brand new steel mill.

★ ★ ★

Three new electric-arc furnaces have replaced the original three open hearths, almost quadrupling the plant's ingot-making capacity, and the steel scrap handling equipment and storage areas have been correspondingly increased.

★ ★ ★

A new 32-inch blooming mill and a 10-inch high-speed, continuous rod and bar mill have been installed, and the 22-inch billet mill has been completely rebuilt and mechanized. The blooming mill, a 2-high reversing mill with 45-ft. manipulator on the entry side, rolls 21 x 23 x 73-inch ingots, weighing approximately 9000 lbs.

★ ★ ★

The 10-inch mill is a high-speed, continuous, double-strand combination rod and merchant-bar mill. It has 21 horizontal stands arranged in four groups—nine roughing stands, four intermediate stands, two looping stands, and six rod-finishing stands. Three vertical edging stands are also installed. Three repeaters provide automatic looping of the rod and merchant bar sections. The last finishing stand of the rod mill operates at a speed of approximately 42 miles per hour.

★ ★ ★

Four laying-type reels are provided for coiling the rod. These are designed to produce coils of 34-inch inside and 46-inch outside diameter, and are capable of handling rod up to 3/8-inch diameter, producing coils weighing 600 lbs.

In the wire mill itself, improvements have also been underway constantly. The wire mill has 20 drawing blocks, three double-deck blocks and 17 continuous units—three 3/4, eight 5/6, and six 6/7 blocks. A standard cleaning line, one 36-strand patenting furnace, and three pot-annealing furnace, with ten bases. Black annealed, bright, annealed-in-process and spheroidized wire products are produced in these furnaces, in a size range from 5/8-inch to 20 gauge.

★ ★ ★

Finishing facilities include straightening and cutting machines and specially developed spooling machines for reinforcing tie wires and automatic baler wire.

★ ★ ★

Becoming the first fully integrated wire mill in Southern California when it went into production, July, 1948, Bethlehem Pacific's wire mill in Los Angeles has developed a beneficial respect with customers in the area for its high quality product. The mill produces: spring wire, tire bead wire, automatic hay baler wire, bolt and rivet wire, border wire, coat hanger wire, cold heading quality wire, concrete form tie wire, chain link fence wire, crimping wire, gravel screen wire, hog ring wire, link fabric wire, nail wire, reinforcing tie wire, zig-zag, no sag, and M.B. spring wire, high carbon head lining wire, and welding wire.

★ ★ ★

Adding to the teamwork of steel production for wire, Bethlehem Pacific's metallurgists are

Fig. 1—Highlighting Bethlehem Pacific's complete rebuilding of the Los Angeles plant, installation of these modern electric-arc steel making furnaces nearly quadrupled production capacity over previous open hearth furnaces. Suppliers of the Los Angeles Wire Mill, these furnaces can now produce in excess of 400,000 ingot tons per year. * * * *

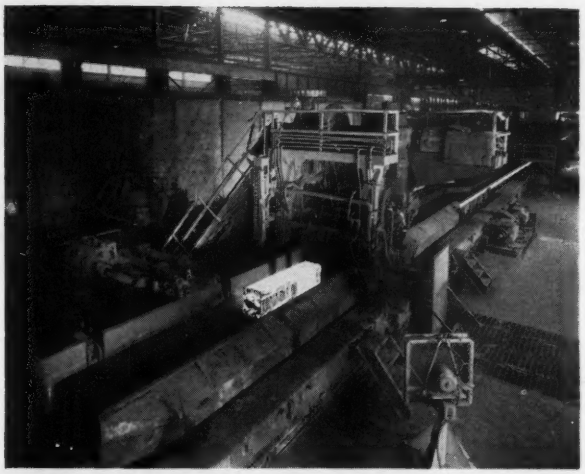


Fig. 2—Completely new rolling mills, installed since the end of World War II at the Los Angeles Plant of Bethlehem Pacific, give increased speed and efficiency to supply of stocks for wire mill. Blooming Mill here receives heated ingot for first of many shaping operations which will end in the drawing dies. * * * * * * * * * *

constantly on the alert, lending their support toward both maintenance of a high quality product as well as aiding wire customers in developing new applications of the product.

As examples: revolutionary new bakery product carrying trays are now made of wire to replace the old wood slat variety. A new quality nail wire was developed to produce a new type "tackless" floor carpeting method.

★ ★ ★

In many other ways, wire of practically every size and specification produced by Bethlehem Pa-

(*Please turn to page* 212)

Fig. 3—Annealing furnaces in Bethlehem Pacific's Los Angeles Wire Mill. Three of these modern furnaces serve ten bases to enable the Mill to produce practically every kind and size of wire. Third furnace (left center) was added to the line last year. * * * * * * * * *

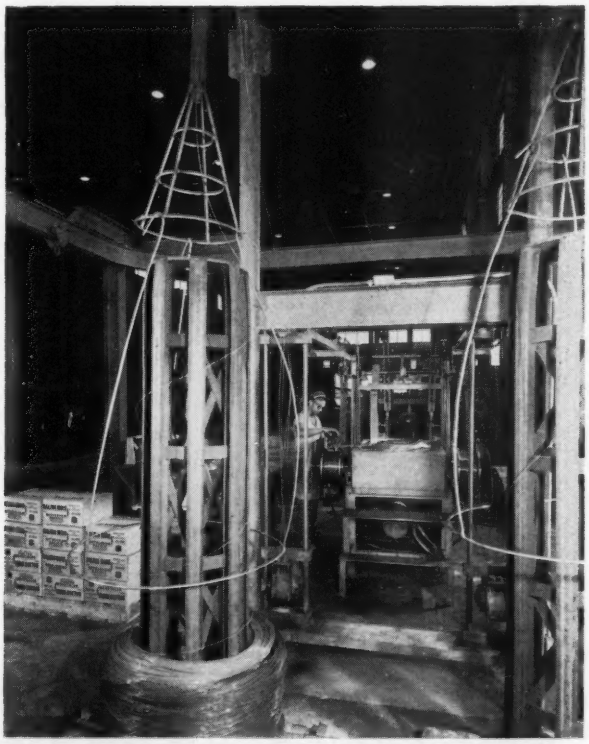
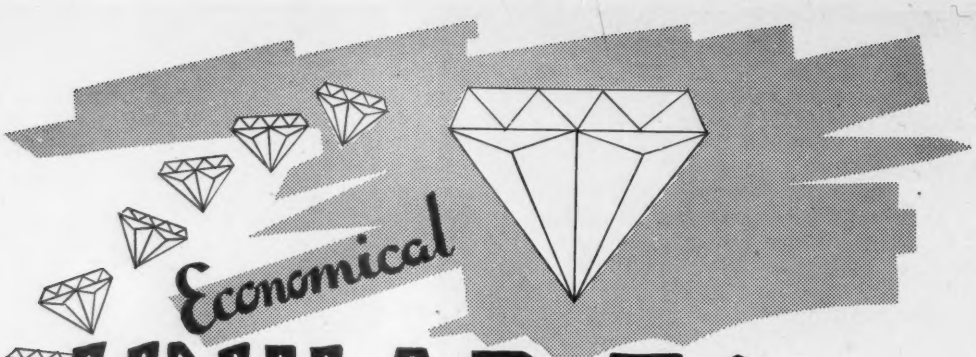


Fig. 4—Spooling Equipment for wire coils for automatic baling wire in the Los Angeles Wire Mill of Bethlehem Pacific. Three coil sizes and lengths are spooled on this machine to fit any make of automatic hay baling machine. * * * * * * * * * * * *



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45	Brown	1.75	5.70
230-325	Purple	1.50	4.85
170-230	Gray-Black	1.50	4.85

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BY THE WIRE ASSOCIATION

THE TIME: April 28 & 29, 1955 • THE PLACE: Commodore Hotel

There will be Technical papers of interest to electric wire and cable manufacturers, to non-ferrous bare wire manufacturers and to ferrous wire producers. For the electric wire and cable men, separate sessions are scheduled, devoted exclusively to their problems.

In addition to this there will be a fine banquet the evening of the 28th and plant tours on the afternoon of April 29th.

THE PROGRAM COMMITTEE

GENERAL MEETING CHAIRMAN: David M. Schmid, Pres., Techalloy Co., Rahns, Pa.

PROGRAM COMMITTEE CHAIRMAN: Clement C. Lawson, Plant Facilities Engineer, Bell Telephone Laboratories, Inc., Murray Hill, N. J.

ASSISTANT CHAIRMAN, FERROUS SECTION: William D. Bawden, Works Manager, The Gilbert & Bennett Mfg. Co., Georgetown, Conn.

ASSISTANT CHAIRMAN, NON-FERROUS SECTION—INSULATED WIRE: John H. Ingmanson, Vice Pres., The Whitney Blake Co., New Haven, Conn.

ASSISTANT CHAIRMAN, NON-FERROUS SECTION—BARE WIRE: Ralph L. Hartwell, Vice Pres., Metal Textile Corp., Roselle, N. J.

CHAIRMAN, PLANT VISITS COMMITTEE: Charles O. Bruestele, Vice Pres., Charge Eng., Syncro Machine Company, Perth Amboy, N. J.

CHAIRMAN, BANQUET AND HOTEL COMMITTEE: Frank E. Harden, President, Camden Wire Company, Camden, N. Y.

Arrangements are being made to provide a program of special interest to the ladies who will come to this meeting with their men folk.

The Program Committee has given assurance that this two-day session will be replete with information and features of interest and value to all wire men — PLEASE MAKE YOUR PLANS NOW TO ATTEND.

FULL PROGRAM DETAILS WILL BE PUBLISHED NEXT MONTH.
WATCH FOR THEM — BUT MEANWHILE, RESERVE THESE DATES.

THE WIRE ASSOCIATION

RICHARD E. BROWN, *Executive Secretary*

453 MAIN STREET • Telephone: STamford 3-0482 • STAMFORD, CONN.

Government Wire Production Information

NBS Advisory Committees Established

During the past year, 12 technical area advisory committees have been established to provide a direct, continuing link between the **National Bureau of Standards** and the organized science and technology of the Nation. Nine scientific and engineering societies have nominated advisory committees to the Bureau in the fields of physics, chemistry, mathematics, metallurgy, ceramics, and electrical, radio, civil, and mechanical engineering. In addition, the National Conference on Weights and Measures, the American Society for Testing Materials, and the American Standards Association have designated groups at the Bureau's request to advise in their areas of special interest.

★ ★ ★

These committees, which will supplement the Bureau's Statutory Visiting Committee, have been set up as a result of recommendations made by the Ad Hoc Evaluation Committee appointed by the Secretary of Commerce in April 1953 to evaluate the Bureau's program in relation to national needs. Under the chairmanship of **Dr. Mervin J. Kelly,** President of **Bell Telephone Laboratories,** the Evaluation Committee conducted a comprehensive survey and reported in October 1953 that the Bureau's statutory functions were well conceived and its operations generally sound. At the same time, however, the Committee recognized the desirability of some means whereby the needs of the Nation's scientific and engineering societies could be expressed and transmitted to the Bureau for implementation in its program.

★ ★ ★

In general, the functions of the advisory committees are twofold. First, each committee plays an external role, in which its members represent formally the interests and needs of their society and interpret its point of view in terms of the NBS program. To encourage objectivity in this function, the advisors are nominated by their society and serve as a committee of the society rather than a committee of the Bureau.

★ ★ ★

The second function, which might be called an internal one, involves assistance to the Bureau on more detailed problems of program formulation and evaluation. Here the committee members work in small groups or panels directly with the heads of the Bureau's various laboratories. Specific advice is given on technical procedures, and suggestions may be made regarding the initiation or possible abandonment of certain lines of endeavor.

MICROMETER PRECISION — MICRO-WELD — TRADE MARK REGISTERED

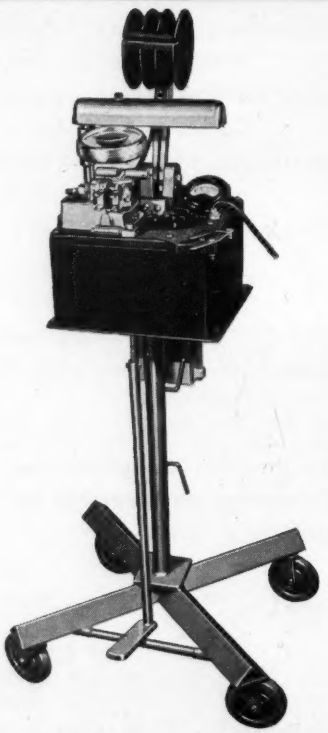
MODEL S.E.M.T. MICRO-WELD BUTT WELDER

This welder was designed and developed expressly for welding all types of fine wire: Aluminum, Copper, Brass, Bronze, Steel and Steel Alloys, ranging in size from .005" to .020" diameter.

Unit design of frame, transformer and power sub-assemblies permit other range of sizes to suit requirements.

Equipped with a temperature indicating annealing and tempering device, voltage regulator and meter to compensate for voltage fluctuation, wire cutters, extra large 5" diameter magnifying glass, fluorescent light and extension cord. Welder can be supplied for bench mounting, or mounted on 4-wheel truck.

The adaptability of this unit for welding all types of wire, either ferrous or non-ferrous, in sizes from .005" to .020" diameter, makes it ideal for the fine wire manufacturer.



MICRO PRODUCTS CO.,

20 NO. WACKER DR., CHICAGO 6, ILL.
Telephone: STATE 2-7468

The advisory committees have now selected their chairmen and have held one or more meetings at the Bureau. The general areas of interest of the various groups have been largely delineated, and some recommendations have been made. It is felt that the special committees will prove a valuable source of consultation and stimulation which will strengthen the ties of the Bureau with American science and industry.

★ ★ ★

These committees cover physics, chemistry, minerals, applied mathematics, electricity and electronics, metallurgy, civil engineering, mechanical engineering and weights and measures.

★ ★ ★

The advisory groups designated by the **American Standards Association** and the **American Society for Testing Materials** have recently held organizational meetings. It is expected that these two committees will concern themselves principally with the Bureau's work in the development of engineering standards, building and safety codes, and purchase specifications. Chairmen of the ASA and ASTM committees are **N. L. Mochel** and **R. E. Gay**, respectively.

Dow Lease on Magnesium Plant Renewed

The General Services Administration has announced that the **Dow Chemical Company** has renewed for three years its lease on the Government-owned magnesium plant at Velasco, Texas.

★ ★ ★

The company acted upon a renewal option in its present lease and at the same time withdrew its offer to buy the plant.

★ ★ ★

Under the option, Dow Chemical will continue to lease the plant until January 31, 1958. Its present lease, due to expire at the end of next month, had been extended for three months in October.

★ ★ ★

In announcing the renewal,

for highest strength and quality

Titan Brass Wire has precisely uniform gauge . . . color . . . texture . . . temper . . . is free from physical defects. For making highest-quality rivets, bolts, nuts, eyelets, fasteners, screws, studs, binding posts, terminals, washers, pins and nails . . . order Titan Brass Wire. Compositions and tempers are supplied to meet every requirement. Let us help you choose the proper wire composition and temper for **Heading & Extruding**
Heading & Drilling or
Forming & Bending

Call your nearest Titan Office

Offices and Agencies in these cities:

Atlanta	Denver	New Orleans	Seattle
Camden	Detroit	New York	St. Louis
Chicago	Houston	Old Lyme, Conn.	St. Paul
Cincinnati	Indianapolis	Salt Lake City	Toledo
Cleveland	Los Angeles	San Francisco	Washington

Mill Depots: Bellefonte, Pa., and Indianapolis

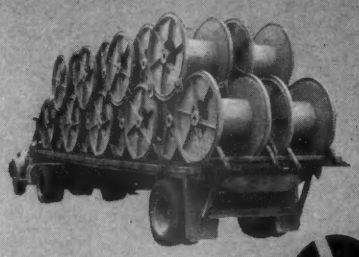
Write today for free folder "Titan Brass Wire" listing grain sizes, weights, tolerances and other data. Address: Customer Service Division, Titan Metal Mfg. Co., Bellefonte, Pa.

Titan®

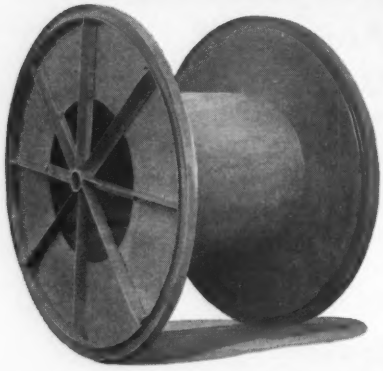
METAL MANUFACTURING COMPANY
General Offices & Plants: Bellefonte, Pa.
Quality Alloys by Brass Specialists

There's no premium on INGENUITY at NYECO

Here are 32 Steel Shipping Reels being delivered on 1 especially rigged truck. One more example of the versatility and flexibility that go into every NYECO job . . . that make for happy customer relationships.



NYECO Steel Shipping Reels



YOUR BEST BUY!

because they cost so little more, last *12 times* longer than wooden reels, require minimum maintenance. Rugged weatherproof, splinter-proof, warp-proof construction protects costly cable against damage due to dropping, bouncing, rough handling. It doesn't pay to risk an investment of thousands on inferior reels.

ANY QUANTITY — ANY SIZE — ANY LOAD — FLANGE DIAMETER FROM 36" UP

SERVICE IS OUR BUSINESS: Qualified engineering staff will translate your problems into practical designs, from idea to finished product—or we'll work from your blueprints. 2 large modern plants with every automatic production facility, 100 in skilled personnel. Fast deliveries—motor, rail, water shipping at the premises.

For prompt, reliable, down-to-earth data and quotations

WRITE, PHONE, WIRE

NYECO — Specialists to the Wire Industries for Over 45 Years

NEW YORK ENGINEERING COMPANY

75 West Street, New York 6, N. Y.

TELEPHONE: WHitehall 4-5380 **CABLE:** NYECO, N. Y. **PLANTS:** YONKERS, N. Y.

These leading mills prefer NYECO Steel Reels: OKONITE, ROEBLING, WESTERN ELECTRIC, GENERAL CABLE, ANACONDA, PHELPS DODGE

James P. Pinkley, Director of the GSA National Industrial Reserve, commented:

"The action assures continued operation of this important plant. Thus its continuing output of magnesium will be available for both defense and civilian requirements. Renewal, moreover, eliminates at least for the present the necessity for the Government to face heavy layaway and maintenance expenses."

★ ★ ★

Earlier the Department of Justice had expressed the opinion that the proposed sale to Dow Chemical would tend to maintain a situation inconsistent with antitrust laws. The three months' extension provided GSA with opportunity to search for other purchasers.

★ ★ ★

One of the largest magnesium producers, the plant, a major installation in the National Industrial Reserve, was built at an original cost of about $26,500,000 and was restored to production in 1950. As an essential defense facility, its sale is subject to the National Security clause which would require the purchaser to maintain it in readiness to turn out magnesium for national security.

Foreign Investment Opportunities

The following possible investment opportunities are listed in a bulletin issued by the Contact Clearing House Service, Office of Small Business, **Foreign Operations Administration,** Washington 25, D. C.:

Insulated Wire — $6,500 — ARK Ltd., Ortakligi, Kablo ve Kaucuk Esya Farrikasi, Serce 33/39, Galata, Istanbul.

Enameled wires and cables—$21,000 —Yetvart Armen Oskay, Okcu Musa Caddesi No. 112/114 Galata, Istanbul.
Rubber Covered Wires & Cables and Rubber Hose Factory—$35,900—Yetvart Armen Oskay, Atkali, Kilise Sokak No. 34/36, Istanbul.
Plastic Covered Wires & Cables — $14,400—Yetvart Armen Oskay, Okcu Musa Caddesi No. 112/114 Galata, Istanbul.

For further information write FOA referring to these items in M/L Group 23, Jan. 6, 1955.

ABSTRACTS

A STUDY OF PREFERRED ORIENTATION IN EXTRUDED, DRAWN AND ANNEALED COPPER

P. G. Bastien (Ecole Centrale des Arts et Manufactures, Paris). J. Pokorny (Centre d'Etudes Superieures de la Siderurgie, Metz). Inst Met Journ 1954 Vol 82 (12) pp 545-549 (Aug)
2 illustr. 15 ref, 4 tables.
Y* C 11.0

★ ★ ★

GLOWING OF BAND IRON AND WIRE IN THE COURSE OF COLD WORKING

D. Grabovsck. Nova Proiz 1954 Vol 5 (¾) pp 254-259 (Sep 1) (In Yugoslav; note in English)
Problems of glowing dealt with in connexion with manufacturing programme of Ironworks of Jesenice, which has been changed to quality manufacture. 11 illustr.
Y* C 11.0

★ ★ ★

THE STRUCTURE AND STRENGTH OF COLD-WORKED METALS

P. B. Hirsch, A. Kelly. Acta Cryst 1954 Vol 7 (10) p 658 (Oct)
Abstr of paper to 3rd Internat Congr. Internat Union of Crystallography, Paris, July 21-28, 1954. Results of micro-beam technique related to microscopic observations of slip.
Y* C 4.0 : C 11.0

★ ★ ★

THE THEORY OF FLOW OF PLASTIC SUBSTANCES ALONG SURFACES

A. A. Il'yushin. Prikladn Mat i Mekh 1954 Vol 18 (3) pp 265-288; Battelle Techn Rev—Abstr 1954 Vol 3 (10) p. 676a (Oct) (Original in Russian)
Y* C 2.22 : C 4.0 : C 11.0

★ ★ ★

DIAMOND DIE PROFILOSCOPE

Longworth Sci Instr Co Ltd. Abingdon, Berks—Brit Sci Instr Res Assoc, Chislehurst, Kent. Ind Diamond Rev 1954 Vol 14 (168) p 238 (Nov)
3 illustr, 1 ref. See Bibl Ind Diamond Appl 1954 Vol 11 p 201 (July). (1184).
X D 11.0 : D 15.2

★ ★ ★

EFFECT OF WIRE DRAWING ON THE TRUE STRESS-STRAIN CURVE

M. S. Mitra, M. G. Fontana. Indian Inst Met Trans 1952 Vol 6 pp 170-192; Battelle Techn Rev—Abstr 1954 Vol 3 (9) pp 601a-602a (Sep)
With discussion.
Y* C 11.0

★ ★ ★

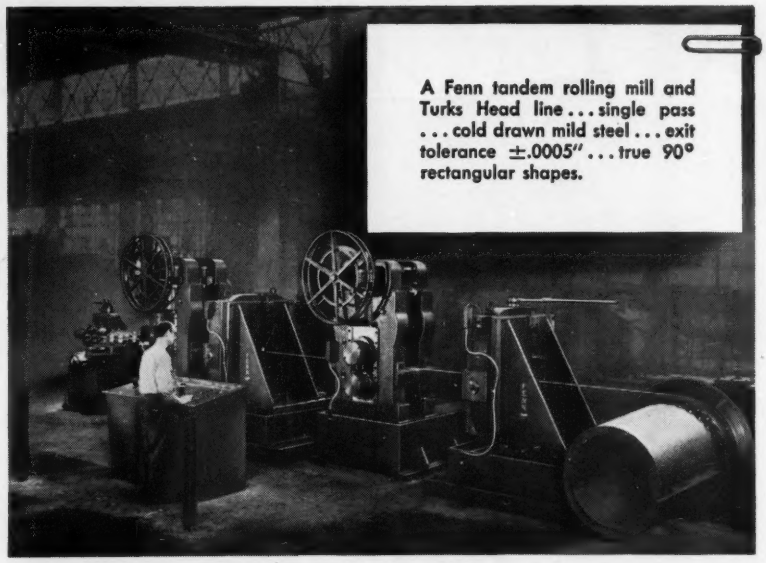
THE BISRA PROFILOSCOPE

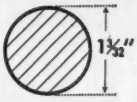
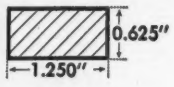
A. E. Ranger. Wire Ind 1954 Vol 21 (250) pp 1015-1018, 1021 (Oct)
Detailed recommendations for use of profiloscope and interpretation of images obtained. Short note of observations on diamond dies. 24 illustr.
G D 11.0 : D 15.2

★ ★ ★

THE WEAR OF DIAMOND DIES

L. Schultink, H. L. Spier, A. J. van der Wagt. Philips Techn Rev 1954 Vol 16 (3) pp 91-97 (Sep)


A Fenn tandem rolling mill and Turks Head line . . . single pass . . . cold drawn mild steel . . . exit tolerance ±.0005" . . . true 90° rectangular shapes.

change  **to** 

in a single pass

- Can you make these and other shapes from round, in one pass, at speeds up to 2000 fpm?
- Can you hold tolerances of ±.0005" over 500 miles of stock, without regrind of dies or tools?
- Can you make an infinite number of squares and rectangles on the same set of dies?
- Can you make true squares and rectangles with sides 90° from top and bottom?

You can, if you own a Fenn line of equipment, made up of machines selected to suit *your* requirements*.

* Precision Rolling Mills — Turks Heads — Wire Shaping Mills — Swaging Machines — Accessories.

FENN

The Fenn Manufacturing Company • 408 Fenn Road, Newington, Connecticut

How can I save by using your Rolling Mills ☐, Swaging Machines ☐, Turks Heads ☐?

*Name*_____ *Title*_____

*Company*_____

*City*_____ *Zone*_____ *State*_____

Forming the above Special Pan Head Bolt in two blows presented a difficult cold heading problem that was solved by the use of Keystone "Special Processed" Cold Heading Wire.

The superior grain flow characteristics of "Special Processed" Wire provided the necessary upsetting and die forming qualities to withstand the terrific displacement of metal during the two blow process. The head was formed without buckling, distortion or cracking — longer die life, increased production, and a higher quality finished product resulted.

Carefully selected ingredients — our own exclusive drawing and heat treating process — rigid quality controls and inspections — give this wire unsurpassed performance on any unusually difficult cold heading job. Your inquiry is welcomed.

See Bibl Ind Diamond Appl 1954 Vol 11 p 230 (Aug). [Title originally incorrectly translated from Dutch]. 9 illustr. 1 table, 3 ref.
G C 11.0 : D 11.0

★ ★ ★

THE PRODUCTION OF HEADED PINS

Wire Prod & Machine Design Ltd, Sidcup, Kent. Machinery (Lond) Vol 84 (2165) pp 1021-1024 (May 14)
Large proportion are pins for miniature valves, made from nickel wire 0.040 in. dia, cut off and ends rounded in special machine. 7 illustr.
Y C 11.0

★ ★ ★

THE THEORY AND PRACTICE OF WIRE DRAWING. II. RESEARCHES CONCERNING WIRE DRAWING DIES

J. G. Wistreich. Australas Eng 1954 pp 61-66 (Mar 8); Battelle Techn Rev——Abstr 1954 Vol 3 (8) p 537a (Aug)
Investigations into die pressure, temp, lubrication and wear. Methods of industrial control.
Y* C 11.0

★ ★ ★

These abstracts are published through the courtesy and with the permission of the Industrial Diamond Research Bureau, 34, Holborn Viaduct, London, E.C.1, England. Inquiries regarding them should be directed to the Bureau.

Standards on Metallic Electrical Conductors

Since its organization in 1909, ASTM Committee B-1, which includes in its personnel leading technical authorities concerned both with the use and manufacture of electrical conductors, has endeavored to make available acceptable testing procedures and sampling methods and specifications covering the quality and other essential features of metallic conductors. Within the past few years there has been intensified activity because of the new materials and composites coming into the picture. The standards in this special compilation, represent the careful and considered technical opinions of leading men in the industry.

★ ★ ★

This 272-page compilation contains 50 standards and specifications relating to copper and copper alloy, steel, composite copper and steel, light metals, tests, and sampling procedures.

★ ★ ★

Copies can be obtained from ASTM Headquarters, 1916 Race St., Philadelphia, Pa. Price: $3.25; to members, $2.50.

Outstanding Personalities of the Wire Industry

Major Rigby Winds Association Clock

The handsome 400-day grandfather clock presented to The Wire Association by John Rigby in 1948 on behalf of our British Association members, was duly wound for another year of accurate time-keeping on December 13, 1954, by **Major C. Patrick Rigby,** Director of John Rigby and Sons Limited, Low Moor, Bradford, England.

★ ★ ★

Thus once again have we been honored by the presence of a distinguished visitor to our shores and reminded that our friends from across the sea bear their American cousins a large measure of good-will—a good-will that we most heartily reciprocate.

★ ★ ★

Major Rigby has been in this country for a little over a month and attended the Silver Anniversary Convention of The Wire Association in Detroit, Michigan, in November, 1954.

★ ★ ★

Major Rigby Winding Clock ★ ★ ★ ★

The Major's name will be inscribed on the parchment that hangs beside the clock and bears the names and connections of those who officiate in this capacity each year.

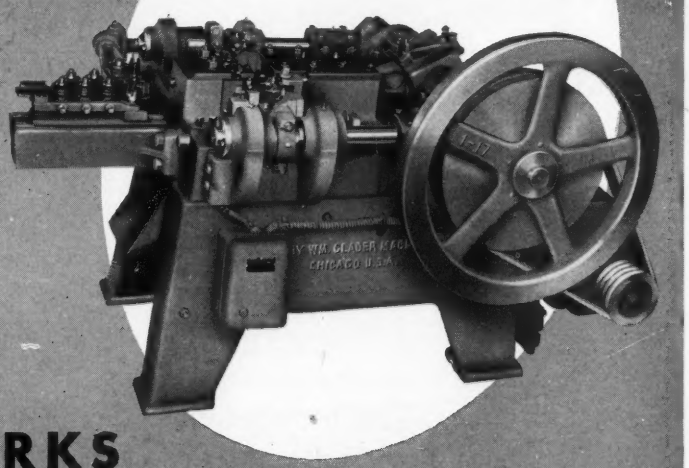
Corson Named Mordica Memorial Lecturer for 1955

An invitation to deliver the Mordica Memorial Lecture at the Annual Convention of **The Wire Association** in Chicago on November 16, 1955 has been extended to and accepted by **John H. Corson,** Manager of Laboratories, **Carpenter Steel Company,** Reading, Pa.

★ ★ ★

The naming of this lecturer is the highest honor within the power of the Board of Directors to bestow upon an individual member of the Association. The selection is made, by the Board of Past Presidents, who constitute a permanent committee charged with

high efficiency — low cost
with GLADER wire nail machines



Eliminate costly down-time in the Nail Mill by replacing obsolete machines with new GLADER NAIL MACHINES . . . For tops in efficiency and economical operation use GLADERS.

WM. GLADER
MACHINE WORKS

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Export Dept.: 122 East 42nd Street, New York 17, N. Y.

the duty of selecting a lecturer each year and the man chosen is one who in their opinion has achieved outstanding distinction in our industry. The lecture is traditionally delivered at the Annual Luncheon during the Convention.

Celanese Expands Chemical Division

Continued growth of the Chemical Division of **Celanese Corporation of America** has necessitated an expansion of the New York sales department staff under **John W. Stevens,** General Sales Manager, it has been announced by **Richard W. KixMiller,** General Manager of the Chemical Division.

★ ★ ★

The new position of Assistant General Sales Manager in charge of staff sales functions, has been created for **R. J. Werner,** who has been District Sales Manager in the Chicago Office. He will be responsible for all staff functions of the sales department, including the supervision of product managers.

★ ★ ★

All district sales managers will be responsible as in the past to **Robert W. Kampschulte,** who is Assistant General Sales Manager in charge of line functions of the sales department.

Metal & Thermit Makes Sales Staff Changes

Metal & Thermit Corporation has announced several changes in its sales organization due to retirements and promotions. These changes, effective January 1, 1955 are as follows:

★ ★ ★

John B. Tinnon, vice president and chief sales executive, who has been with Metal & Thermit since 1924, retires, but will remain as a consultant. Mr. Tinnon, a former director and an honorary member of the American Welding Society, also has been active in the Manufacturing Chemists Association. At present he is a member of the Board of Governors of the National Electrical Manufacturers Association.

★ ★ ★

Donald K. Morgan, is promoted to general sales manager. Mr. Morgan has been chief assistant to Mr. Tinnon.

★ ★ ★

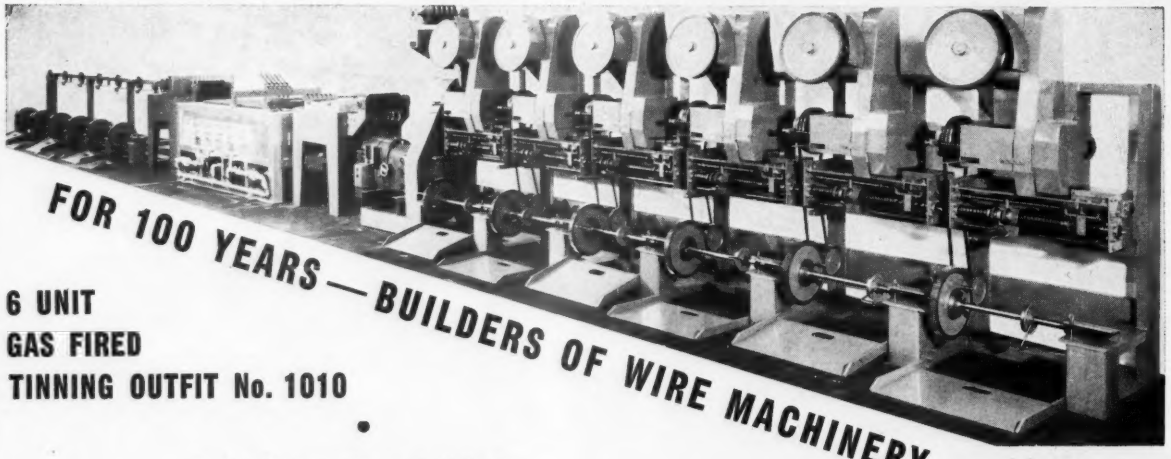
O. L. Howland, formerly manager of sales of the company's welding division is promoted to assistant to the general sales manager with headquarters in East Chicago, Ind. and is now the chief sales executive in this area.

★ ★ ★

Merritt L. Smith, manager of advertising and sales promotion, assumes the additional duties of Eastern assistant to the general sales manager, and will continue to make his headquarters at the company's main office in New York City.

★ ★ ★

Robert T. Brown, former Metal & Thermit district manager in Pittsburgh, Pa., is promoted to the position of manager of sales of the



6 UNIT
GAS FIRED
TINNING OUTFIT No. 1010

Send for information on the following:

WIRE ANNEALING, TINNING and GALVANIZING OUTFITS

MULTIPLE or SINGLE UNIT WIRE TAKE-UPS

FINE WIRE DRAWING MACHINES

MAGNET WIRE ENAMELING EQUIPMENT, INCLUDING

PRE-ANNEALERS, SYNTHETIC ENAMEL APPLICATORS and CIRCULATING SYSTEMS

COTTON, GLASS-FIBRE and TAPE COVERING MACHINES

EST. 1855 AIMCO INC. 1915

"American" AIM INSULATING MACHINERY COMPANY

REG. U.S. PAT. OFF.

FAIRHILL AND HUNTINGDON STREETS

PHILADELPHIA 33 PENNSYLVANIA U.S.A.

welding division, with headquarters in New York.

★ ★ ★

Kenneth H. Zeigler, sales engineer with the company in the Pittsburgh area since 1951, has been promoted to the post of district manager at Pittsburgh.

Appoints West Coast Sales Manager

Thomas A. Printon, President of the **Nopco Chemical Company** has announced the appointment of **Travis V. Rankin** as General Sales Manager in charge of sales of all Nopco products at Nopco's Pacific Division. Mr. Rankin replaces **Harold A. Swanson,** who has become Assistant Vice President in charge of the Vitamin Division of Nopco.

★ ★ ★

Formerly District Manager for the Central Sales District, Mr. Rankin has been with the company since 1936. A graduate of Lewis Institute in Chicago with a B. S. in chemistry, he began work for Nopco as a chemist. A year later he became Nopco's Industrial Sales Representative in the Southwest territory. In his new assignment, he will make his headquarters at the Pacific Division's main office in Richmond, Calif.

★ ★ ★

Taking Mr. Rankin's place as Central District Sales Manager will be **Walter E. Brewer,** who will also continue in his present capacity as Manager of Nopco's Eastern Industrial Sales District.

★ ★ ★

Mr. Brewer joined Nopco in 1936, also as a chemist. Two years later he became a member of Nopco's sales force, and in 1948 he was appointed Manager of the Eastern Industrial Sales District. Mr. Brewer will continue to make his headquarters at Nopco's main office in Harrison, N. J.

Apex Alkali Adds Man in Midwest Territory

As of January 3, 1955, **Daniel R. Dunkle** joined the Sales Staff of **Apex Alkali Products Co.,** to serve the Western Pennsylvania, Ohio and Indiana area, according to an announcement by **W. B. Bauzenberger,** Sales Manager.

★ ★ ★

Mr. Dunkle is a graduate of the Pittsburgh Institute of Aeronautics. He has served in the U. S. Air Force where he received extensive Electronic Training. Prior to returning to the East, he was a member of the firm, U. S. Helicopters in California, of which he was Divisional Sales Manager.

★ ★ ★

Mr. Dunkle has been a representative for Walter Kidde Co. and Aviation Lubricants, Inc., in the Western Penna., Ohio and West Virginia area for the past year.

★ ★ ★

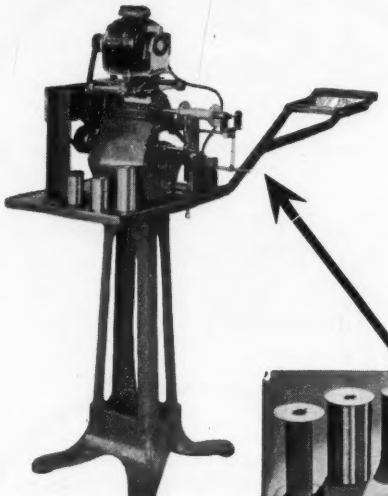
He resides at 709 Allegheny Ave., Oakmont, Pa.

Appointed Assistant Manager of Rigbys

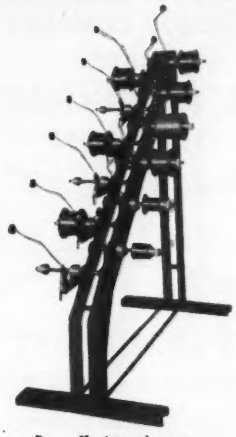
R. G. Swiffen has been appointed Assistant Manager (Technical) of John Rigby and Sons Limited, Low Moor, Bradford, England. Mr. Swiffen visited the United States in 1948, when he was connected with the Rollason Wire Company of Birmingham.

STANDARD UNI-DRIVE WIRE WINDER

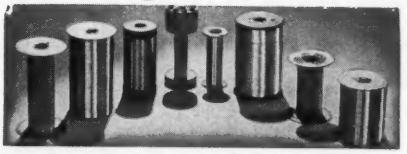
INCREASE YOUR PRODUCTION WITH THIS WINDER



Wire Winder



Pay-off Attachment



Various types of supply packages that may be wound on Standard Uni-Drive Wire Winder.

PAYOFF

Our payoff attachment is made with self-aligning ball bearings and a compensating attachment to control the tension of each end. Applies same tension when spool is empty as when full.

The new Uni-Drive Winder with Payoff Attachment is new in design and incorporates several improved and tested features. Production is stepped up through increased speed. It produces smooth, even and accurately wound spools of wire in single or multiple ends. All strands parallel—no over or under-winding. Automatic Stop-Motion controls each strand. Compensating attachment produces perfectly controlled tension. Traverse adjustable from 1¾" to 5½" between spool heads without changing cam. Designed especially for winding wire to be braided and shielded for electrical conductors up to ¾" diameter.
Payoff can be equipped with Carboloy Guide Inserts at additional cost.

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Allshouse Named Aetna-Standard Vice-President

E. E. Swartswelter, President, announces the election of **R. L. Allshouse** as a Vice President In Charge of Foreign and Flat Product Sales of **The Aetna-Standard Engineering Company,** Pittsburgh, Pa.

★ ★ ★

He had been appointed Manager of Foreign Sales in 1952, after serving as Manager of Sheet and Strip Sales since 1949. Allshouse's experience with Aetna-Standard dates back to 1927 when he started in the Ellwood City plant as a machinist. He moved into engineering and served in several capacities, including detailer, designer, checker and squad leader. Experience with installation of sheet galvanizing line equipment motivated him into sales in 1938. He has specialized in flat-rolled equipment, particularly Continuous Galvanizing lines.

Continental Can Elects Officers

Continental Can Company's board of directors has elected **Lawrence Wilkinson** as group vice president and **Charles B. Stauffacher** as vice president in charge of finance, it has been announced by **General Lucius D. Clay,** chairman of the board.

★ ★ ★

Mr. Wilkinson, who has served as vice president in charge of finance since January, 1952, will, in his new capacity, direct the activities of the company's fibre drum, paper container, flexible packaging and crown and cork divisions.

★ ★ ★

Mr. Stauffacher has been control officer of Continental since December, 1952. Prior to that time, he served as executive assistant director for the U. S. Bureau of the Budget. His government assignments included those of staff director and assistant to Charles E. Wilson, Office of Defense Mobilization, and executive secretary of the advisory committee on production equipment for that office.

★ ★ ★

Raben C. Schenk, who has served as assistant control officer since last July, has been named acting control officer. He formerly was assistant to the vice president of the company's paper container division at Newark.

Owens-Corning Fiberglas Promotes Four Men

Four personnel changes in the Textile Division of **Owens-Corning Fiberglas Corporation** have been announced by **John H. Thomas,** company vice president and general manager of the division.

★ ★ ★

George Volckhausen was appointed assistant sales manager of the division, **Roy J. Black** manager of the Industrial Sales Division, **Matthew T. Nemeyer** manager of the Plastics Reinforcement Sales Division and **Victor W. Boeker** Director of Purchases.

★ ★ ★

Mr. Volckhausen, formerly assistant manager of the Owens-Corning New York sales branch, joined the company in 1942. While a salesman in the Buffalo branch, the position he held prior to coming to New York in 1952, he was named Fiberglas textile salesman of the year.

130 year old

PLYMOUTH CORDAGE COMPANY

announces

THE PLYMKRAFT DIVISION

established to serve

THE WIRE INDUSTRY

Staffed by top-flight engineers available for consultation on any cable filler problems.

PLYMKRAFT Improved Cable Filler

Made To Fine Tolerance
Always Uniform
Twisted To Your Exact Specifications

Available in any type of put up to conform with your equipment requirements. Facilities for applying any type of treatment—such as wax, jute saturant, anthracene. Write for Samples

PLYMOUTH CORDAGE COMPANY

Plymouth, Massachusetts
New Orleans, Louisiana

PLYMOUTH TRADE MARK 1824

Mr. Black joined Fiberglas in 1942. He has held a number of managerial posts related to sales of Fiberglas textile products, including those of assistant sales manager of the Textile Products Division and manager of the electrical sales division. He is a graduate of Ohio State University.

★ ★ ★

Mr. Nemeyer joined Owens-Corning in 1945 and has held a number of sales positions in the company, the most recent having been that of manager of the Industrial Sales Division. He attended the University of Toledo and during the war served as a pilot in the Air Force.

★ ★ ★

Mr. Boeker has played an important part in the development and promotion of Fiberglas yarns since joining Owens-Corning in 1943. After engaging in engineering developmental work he became assistant to the general manager of the Textile Products Division and most recently served as manager of the Plastics Reinforcement Sales Division. He is an engineering graduate of the University of Illinois.

Made General Works Manager of Phillips Electrical Co.

Following the appointment of **A. Lauder** as Vice President (Production and Engineering), **J. E. Thomas** becomes General Works Manager of **Phillips Electrical Company (1953) Limited.** Mr. Thomas has been with the Company since 1946, and has been Production Manager for the past few years. He brings a thorough background of production experience to his new position. Before joining Phillips, Mr. Thomas had been with the wire and cable division of Canadian General Electric for many years. He is well known in the electrical field.

International Nickel Appointments

James B. Morey has been appointed in charge of the Cincinnati, Ohio, Technical Field Section of the Development and Research Division of **The International Nickel Company, Inc.**, and **William S. Mounce** has joined the division's staff in New York City as a member of the Constructional Alloy Steel Section, it has been announced by Donald J. Reese, Assistant Manager of the division.

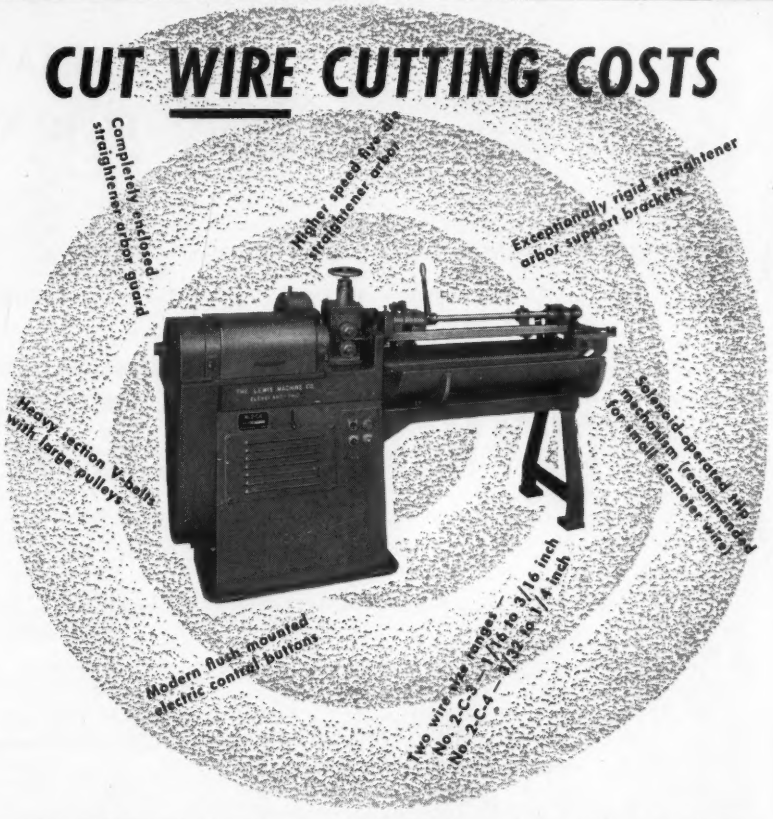
★ ★ ★

Mr. Morey succeeds **C. T. Haller, Jr.**, who was recently appointed in charge of the company's Pittsburgh, Pennsylvania, Technical Field Section. A graduate in mechanical engineering of Cornell University, Mr. Morey has been associated with International Nickel since 1939 when he joined the company as a member of the West Coast Technical Field Section at Los Angeles, California. Before joining Inco he was with Atlas Crucible Steel Co., Dunkirk, N. Y.; Southern California Edison Co., Los Angeles; Morey and Jones, Limited, Los Angeles, and the Metropolitan Water District of Southern California, Los Angeles.

★ ★ ★

Mr. Mounce joined International Nickel in 1945 as a member of the New England Technical Field Section at Hartford, Connecticut. He graduated from Tufts College in

CUT WIRE CUTTING COSTS


Completely enclosed straightener arbor guard
Higher speed five die straightener arbor
Exceptionally rigid straightener arbor support brackets
Solenoid-operated trip mechanism (recommended for small diameter wires)
Heavy section V-belts with large pulleys
Modern flush mounted electric control buttons
Two wire size ranges — No. 2-C-3 — 1/16 to 3/16 inch
No. 2-C-4 — 3/32 to 1/4 inch

with LEWIS 2-C wire straightening and cutting machines

Only **LEWIS 2-C-3** and **2-C-4** wire straightening and cutting machines have **all** of these features for fast, accurate and economical production. Their practical design and sturdy construction, reflecting more than 40 years' experience in manufacturing wire machines for **every** production requirement, assure uninterrupted service and maximum production at minimum cost. Write, wire or call today for additional information on LEWIS 2-C wire straightening and cutting machines.

Literature is available on the COMPLETE Lewis line of 23 machines for wire from .012" and stock to 3/4".

THE LEWIS MACHINE CO.

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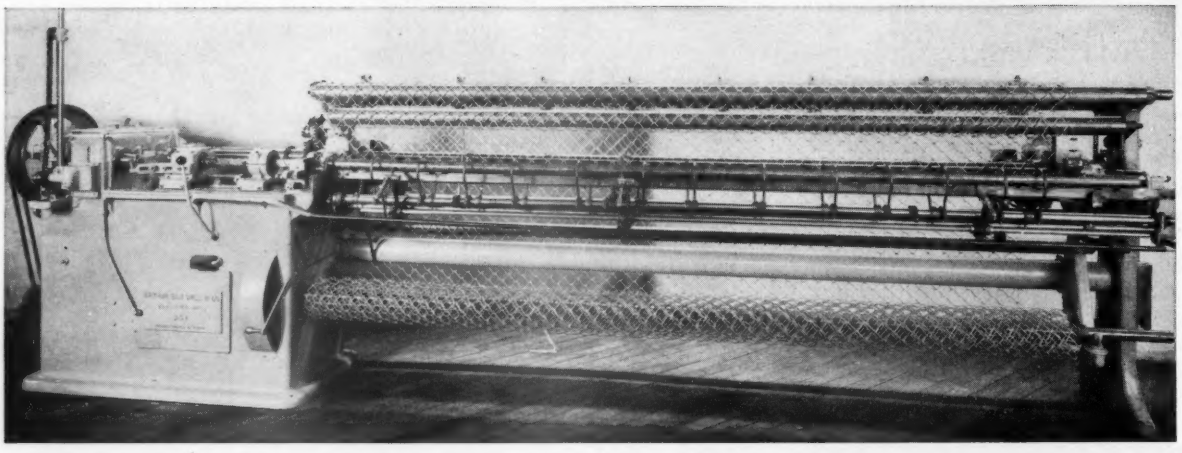
CAMDEN WIRE CO., INC.

Wire Fabricators

MANUFACTURERS OF BARE, TINNED AND SILVER PLATED STRANDED COPPER WIRE, CONCENTRIC OR BUNCHED

40 Masonic Avenue • Camden, New York

INVINCIBLE CHAIN-LINK FENCE MACHINE



• Compared with any other Chain-Link Machine in existence, its saving in wire will pay of its own cost price, in full in one year's Operation. • It is designed for the regular range of wire gauges, meshes and heights. • Either or both edges may be barbed or knuckled, as desired. • Its production, for example, on 2" mesh, #9 fence, 7' high, exceeds 2000 square feet per hour.

See it in operation here at our plant. It will convince. Please advise if and when you will call.

ARTHUR BLASHILL & COMPANY
91 Webster Street
WORCESTER, MASSACHUSETTS, U.S.A.

1939 with the degree of Bachelor of Science in Chemistry and then attended M. I. T., studying metallurgy. In 1940, he was appointed senior metallurgist with Hamilton Standard Propeller Division, United Aircraft Corporation.

Firth-Loach Appoints Officer

Firth-Loach Metals, Inc., of McKeesport, Pennsylvania, newest carbide metal producer in the country, announces the appointment of **John P. Parks** as Secretary and Comptroller.

★ ★ ★

Before joining Firth-Loach, Mr. Parks was a Senior Cost Analyst with United States Steel Company for three years. From 1946 to 1951 he was with Firth-Sterling and Carbide Division Cost Supervisor. In this capacity, he developed and installed a standardized cost accounting system that covered reduction of ores to tungsten powders, cemented carbides, finished tools and dies. He also simplified order forms, production schedules, invoicing procedures, and established cost estimating procedures for carbide products.

★ ★ ★

An industrial accounting major at college, he has taken post graduate work in Industrial Management at Pennsylvania State College.

Named Superintendent of Aetna-Standard Warren Plant

Frank Todd, former production manager, has been appointed superintendent of the **Aetna-Standard Engineering Company's** Warren plant, succeeding **L. A. Crutchley.** The appointment became effective December 1, 1954.

★ ★ ★

Mr. Todd joined Aetna-Standard seven years ago, working in the proposal estimating department. While at Aetna, his experience has been varied, as he worked in the different departments at the Aetna Warren plant.

★ ★ ★

Prior to joining Aetna-Standard, Mr. Todd was employed as a machinist at the **Republic Steel Corporation.**

Made Merchandising Manager of Textile Div. of Celanese

John W. Brooks has been appointed merchandising manager of the Textile Division, **Celanese Corporation of America,** in which capacity he will assist **John Holmes,** vice president in charge of merchandising, Textile Division, in all phases of his activities.

★ ★ ★

Mr. Brooks, formerly vice president and general sales manager of Spring Mills, Inc., assumed his new duties on January 3, 1955.

Laclede Elects Vice President

Laclede Steel Co., St Louis, Mo., has elected **Alfred A. Boyle** Vice President in Charge of Operations. He has been in the company's mechanical and operating departments for the last several years and has been serving as general superintendent in charge of all company operations. Mr. Boyle succeeds to the office vacated several years ago with retirement of **John W. Gething.** He continues headquarters in the Alton, Ill., Works of the company.

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The finest always costs a little more

You get all three with DIADUST* . . . PURITY—QUALITY—BLOCKY SHAPES

Diamond Powder is only a fraction of the many costs in wire manufacturing. But it helps to keep costs down when you get the best.

Wire drawing dies that are lapped and polished with DIADUST can be made faster and will draw more pounds of wire, cutting your costs materially. DIADUST, made by a special process, gives you all three . . . PURITY—QUALITY—BLOCKY SHAPES

Buy DIADUST with the utmost confidence in its greater effectiveness and uniform quality.

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Magnification
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A Review of Recent Wire Patents

No. 2,696,013, NAIL PRODUCING DIE-SET FOR PUNCH PRESSES, patented December 7, 1954 by David T. Theodore, Elmhurst, N. Y.

Included are upper and lower companion dies attachable respectively to the ram and bolster of the press, with a wire centering guide at one end of of the lower die for longitudinally guiding nail wire stock for cutting and operable in conjunction with the dies.

★ ★ ★

No. 2,696,164, TRUCK FOR HANDLING SPRING ASSEMBLIES, patented December 7, 1954 by Joseph W. Droll, Chicago, Ill., assignor, by mesne assignments, to United Mattress Machinery Company, Quincy, Mass., a corporation of Maine.

More specifically, the truck is adapted for handling bales of wire spring assemblies employed in the making of seats, mattresses and the like. There are six claims.

★ ★ ★

No. 2,696,227, JOINING WIRE, patented December 7, 1954 by William Alfred Billings and Zygmunt Brzozowski, London, England, assignors to International Standard Electric Corporation, New York, N. Y.

A machine is provided for automatically forming electric lead wires each having three co-linear parts butt-welded end to end.

★ ★ ★

No. 2,696,327, WIRE FEEDER, patented December 7, 1954 by Maurice D. Woodruff, Springfield, Ohio, assignor to The Bauer Bros. Company, Springfield, Ohio, a corporation of Ohio.

The wires are fed so that, as they descend through the machine, they are self-aligned as they approach the feed roll and are continuously fed thereby in contradistinction to being intermittently fed.

★ ★ ★

No. 2,696,328, BLANK FEEDING APPARATUS, patented December 7, 1954 by Louis Steinfurth, East Cleveland, Ohio, assignor to The National Screw & Manufacturing Company, Cleveland, Ohio, a corporation of Ohio.

Headed screw blanks are fed to a selector drum for feeding.

★ ★ ★

Reissue 23,911 ATTACHMENT FOR PAINT CANS, patented December 14, 1954 by John W. Tatter, Akron, Ohio.

A single length of bent wire of galvanized half-hard steel is formed to provide the attachment.

★ ★ ★

No. 2,696,848, RELAY WIRE CONTACT INSERTING MACHINE, patented December 14, 1954 by Ralph E. McCoy, St. Petersburg, Fla., assignor to International Business Machines Corporation, New York, N. Y., a corporation of New York.

This is a machine for shaping and inserting wire contacts in place within electromagnetic relays and where the wire contacts are to be used as elements of the relays. There are 17 claims.

★ ★ ★

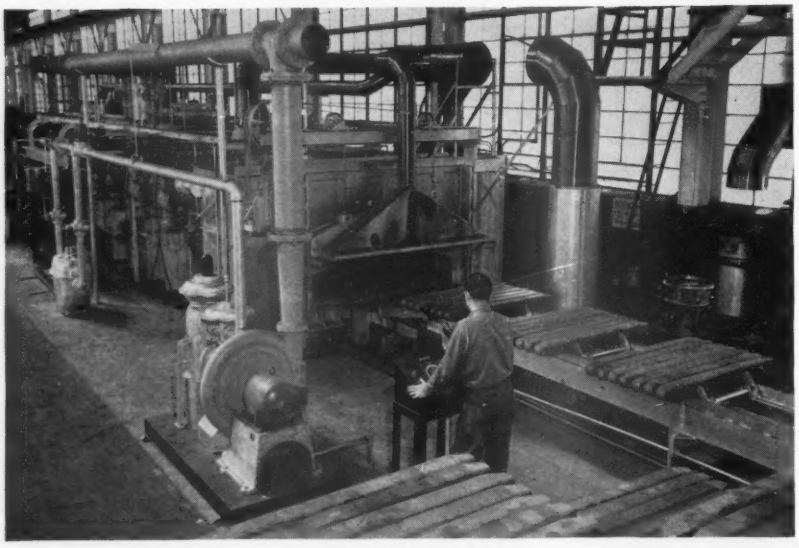
No. 2,696,849, METHOD OF MAKING FILAMENT MOUNTS, patented December 14, 1954 by John Flaws, Jr., East Cleveland, and John W. Anthony, Cleveland Heights, Ohio, assignors to General Electric Company, a corporation of New York; patent dedicated to the Public insofar as it relates to lamps and lamp parts to the extent stated in document recorded in the United States Patent Office, January 4, 1954, Liber U-238, page 394.

The method is disclosed of reshaping an incandescent lamp mount comprising a stem having an arbor projecting axially therefrom and a pair of spaced leading-in wires projecting from the stem at an acute angle to its axis and extending to a transverse plane adjacent the end of the arbor, and three support wires anchored in the arbor and extending radially outward away from the leading-in wires and with their free ends located in this plane, and a horseshoe-shaped coiled filament in this plane and secured at its ends to the free ends of the leading in wires and supported at spaced points intermediate its ends by loops in the support wires.

★ ★ ★

No. 2,696,850, CRIMPING DEVICE, patented December 14, 1954 by Kenneth

The Making of Copper Wire Starts Here



In a Rockwell Wire Bar Furnace

This continuous, chain conveyor type, gas-fired furnace heats copper wire bars and slabs scale-free up to 1650° F. Bars range in length from 30" to 60" and weigh up to 290 lbs. each. Heating capacity is 12,500 lbs. of copper, or an average output of fifty 250-lb. bars per hour.

Rockwell has built a large number of furnaces of various types for heat-processing steel and non-ferrous alloys from raw bar stock to finished heavy or fine wire right down to enameling, tinning or synthetic or glass-coating magnet wires.

It will pay you to learn more about Rockwell wire heating equipment. Get Bulletin 432.

ROCKWELL SINCE 1888 BUILT

W. S. ROCKWELL COMPANY

FURNACES • OVENS • BURNERS • VALVES • SPECIAL MACHINERY

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Sales Representatives in Principal Cities

E. Peterson, New Cumberland, Pa., assignor to Aircraft-Marine Products, Inc., Harrisburg, Pa.

More specifically, special apparatus is provided for hydraulically operating a hand-held tool for crimping connectors to wire wherein a die and nest are forced toward each other under high pressure.

★ ★ ★

No. 2,696,871, SINUOUS SPRING FOR CUSHION CONSTRUCTION, patented December 14, 1954 by Arthur V. Handren, Jr., Birmingham, Mich., assignor to No-Sag Spring Company, Warren Township, Mich., a corporation of Michigan.

A spring element is disclosed made of wire bent back and forth to form adjacent oppositely presenting loops joined by straight portions, and a U-shaped spring element made of wire in a similar manner having the loop of one end secured rigidly to a loop adjacent to the end of said first spring element, the gauge of the wire of the second spring element being greater than the gauge of the wire from which the first spring element was made, the opposite end of the first spring element being deflected inwardly at an angle to the adjacent arduate portion.

★ ★ ★

No. 2,697,262, PANEL CLIP, patented December 21, 1954 by Anders C. Olsen, Forest Hills, N. Y.

For use as a retaining and clamping element in paneled building constructions, as in gripping the aligned margins of adjacent panels, the inventor provides a relatively stiff single wire structure bent to shape to form two triangles, joined at one like corner of each by a bridge.

★ ★ ★

No. 2,697,470, SPRING WINDING MACHINE, patented December 21, 1954 by Peter M. Sampatacos, Torrington and Edward E. Franks, Jr., Litchfield, Conn., assignors to The Torrington Manufacturing Company, Torrington, Conn., a corporation of Connecticut.

Wire springs are formed upon this machine. There are 19 claims.

★ ★ ★

No. 2,697,499, WIRE MESH BRAKE DISK, patented December 21, 1954 by Henry James Butler, Sutton Coldfield, England, assignor to Dunlop Rubber Company Limited, London, England, a British company.

A brake disc is disclosed which comprises an inner ring, an outer ring concentric with this inner ring and an annulus of interlaced wire mesh secured at its outer periphery to the inner periphery of the outer ring and secured at its inner periphery to the outer periphery of the inner ring and comprising layers of wire gauze having the meshes of one layer at an angle to the meshes of an adjacent layer.

★ ★ ★

No. 2,697,540, CARRIER FOR DAIRY PRODUCTS, patented December 21, 1954 by Andrew D. Malliaris, East Haven, Conn.

This hand carrier is constructed nearly wholly of a number of wires.

★ ★ ★

No. 2,697,740, WIRE INSULATION, patented December 21, 1954 by Izador J. Novak, Trumbull, Conn., assignor to Raybestos-Manhattan, Inc., Passaic, N. J., a corporation of New Jersey.

About the wire conductor is a coating of asbestos which is the residue of a dispersion of finely divided asbestos fibers in a liquid.

★ ★ ★

No. 2,697,867, ELECTRIC CABLE, patented December 28, 1954 by Adrian Neville Arman, London, England, assignor to Pirelli-General Cable Works Limited, London, England, a British Company.

This patent covers a process for the manufacture of a flat, three-core metal sheath-enclosed electric cable wherein the axes of the cores are in plane with one another.

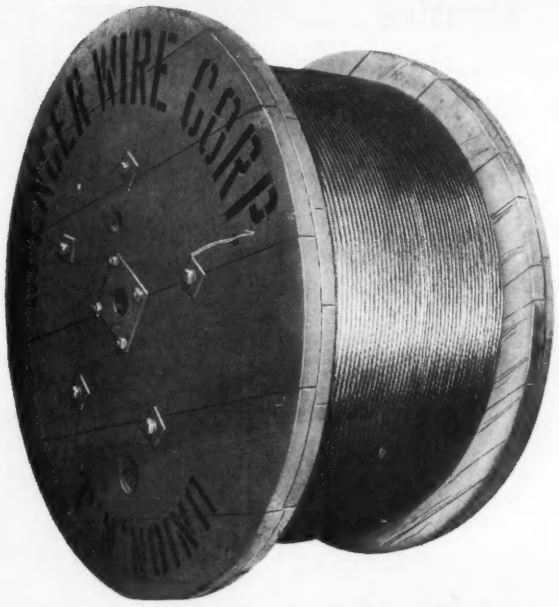
★ ★ ★

No. 2,698,081, WIRE FEED MECHANISM, patented December 28, 1954 by Joseph A. Rice, Ensley, Ala., assignor to United States Steel Corporation, a corporation of New Jersey.

The feed mechanism for a wire-fabricating machine is so arranged that a wire is gripped during the full stroke of the carriage as it moves toward a bedplate and released as the carriage returns.

★ ★ ★

No. 2,698,353, ELECTRIC CABLE, patented December 28, 1954 by Robert S. Carr, Maplewood, N. J., and Tore N. Anderson, Huntington Station, N. Y., assignors to Airtron, Inc., Linden, N. J., a corporation of New Jersey.



all sizes and constructions of high quality copper and bronze wire

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Plants at UNION, N. J. Telephone: MUrdock 6-7950

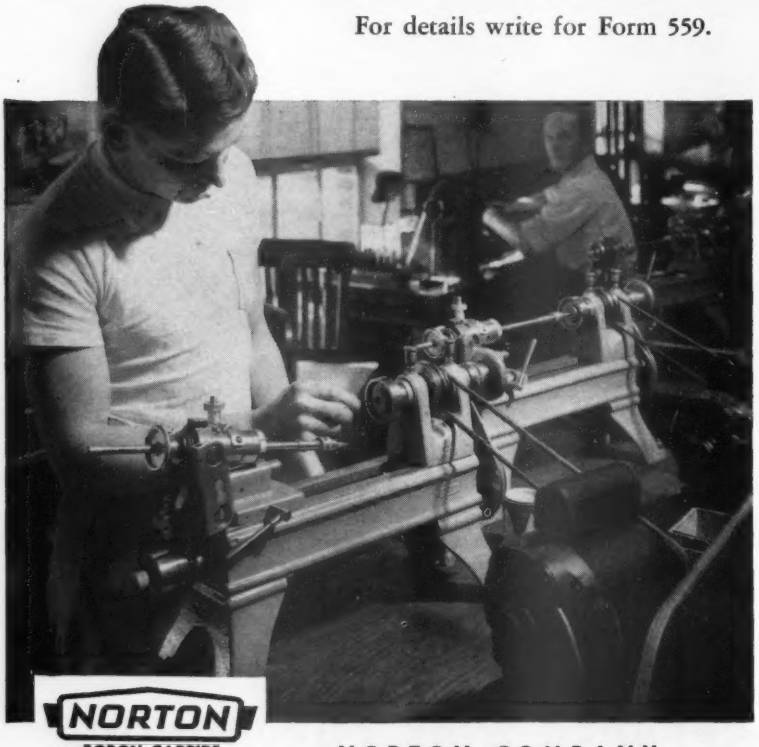
This cable comprises a flexible wire conductor, a flexible dielectric sleeve intimately surrounding the conductor, and a coagulable fluid, conducting composition of lower conductive strength than the material of the conductor, disposed between it and the sleeve throughout the length of the two and about the conductor; this fluid, conducting composition including a liquid, of low viscosity, which is incapable of complete evaporation at temperatures to which the cable may be subjected in the normal use thereof and conducting solids of approximately colloidal size in the liquid.

The information in this section is furnished by the patent law offices of LANCASTER, ALLWINE & ROMMEL, 438 Bowen Bldg., Washington 5, D. C. Data listed is only a brief review of recently issued patents obtained by various U. S. Pat. Off. registered attorney for manufacturers and/or inventors. Complete copies may be obtained direct from Lancaster, Allwine & Rommel by sending 50¢ for each patent desired. Outside of the U. S. and Canada the cost is $1.00 for each copy.

Save Money with NORBIDE® Abrasive . . .

Are you still using costly diamond dust for refinishing your wire drawing dies? Many wire mills are saving money by using NORBIDE Abrasive for ripping or fast stock removal as well as for accurate semi-finishing operations.

For details write for Form 559.



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NORBIDE® . . . *the hardest man-made abrasive*

Signal Corps Sponsors Successful Meeting

The Third Annual Wire and Cable Symposium, sponsored by **Wire Communications Branch** of the **Coles Signal Laboratory, Signal Corps Engineering Laboratories,** Fort Monmouth, N. J., under the title "Technical Progress in Communication Wires and Cables", was held at the Berkeley-Carteret Hotel in Asbury Park, N. J. on December 7, 8, and 9, 1954.

★ ★ ★

The affair was a great success, due in no small measure to the careful planning of the Chairman of the Program Committee, **Howard L. Kitts,** Coles Signal Laboratory; his co-chairman, **H. F. X. Kingsley,** of the same department, and their six industry committee members.

★ ★ ★

The visitors were welcomed by Brig. Gen. F. F. Uhrhane, Commanding General of the Signal Corps Engineering Laboratories, who expressed his belief that these symposiums were most important insofar as they afforded electric wire and cable men an opportunity to discuss their common problems with one another and with Signal Corps personnel. At the close of his address he extended an invitation to those present to visit the new Signal Corps Laboratory, which, now one-third complete, will be the largest wire and cable laboratory in the world. General Uhrhane also noted that the Symposium had taken on an international significance, as there were visitors from Canada, France, England and Australia present.

★ ★ ★

Altogether in the three-day session, some 24 papers were presented and a motion picture shown through the courtesy of the Rome Cable Corporation.

★ ★ ★

Tuesday evening, from 5:30 to 7:00 P. M., some 58 concerns jointly sponsored a pleasant cocktail hour to the accompaniment of a four-piece orchestra.

Wednesday evening was devoted to a banquet and entertainment program after an excellent dinner, with Ed Love of the Signal Corps toastmaster. There were a number of brief talks, followed by an address on communications in Berlin by **Col. Alton O. McLean,** Commanding Officer of the Signal Corps Plant Engineering Agency. This was followed by a series of acts supplied by the Program Committee for the entertainment of the guests, which lasted until midnight.

★ ★ ★

Mr. Love announced that 550 persons had registered, 360 were present at the banquet, and approximately 100 wire and cable concerns were represented at the meeting.

Raw Materials for Electric Cables

A new book by **A. King** and **V. H. Wentworth,** published by **Ernest Benn Limited,** London, England, 362 pages; price $7.00.

★ ★ ★

It is a comprehensive account of the materials used in electric cable construction for the outer insulating covers. The authors have had the benefit of long and wide experience with a leading cable-making company.

★ ★ ★

The text covers all of the basic materials, their sources, characteristics and the tests to which each should be subjected before acceptance for a particular application. Numerous other concerns and individuals have contributed their help to make this an authoritative work.

★ ★ ★

Papers, insulating oils and compounds, varnished cambric, rubber, synthetic rubber, polythene, lead, aluminum, steel, textiles, lacquers, impregnants, enamels, inorganic materials (glass, magnesia, asbestos, etc.) and other insulations are discussed.

★ ★ ★

The book starts with a chapter on copper, treating of its sources, refining and processing into wire, testing, etc., inasmuch as this metal is the conventional material for electric conductors. A complete index concludes the work.

★ ★ ★

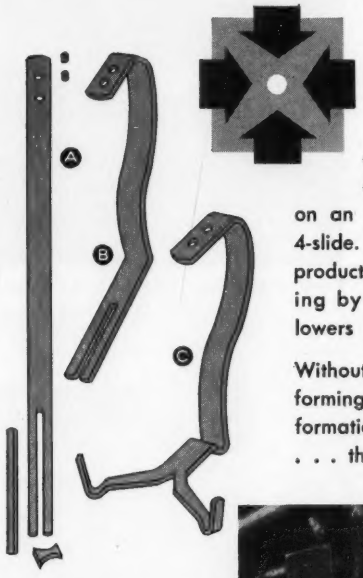
Copies may be ordered from the U. S. distributor, **John de Graff, Inc.,** 64 West 23rd St., New York 10, N. Y.

Atomic Energy Guideletter

Some 860 concerns are now using atomic energy by-products in 1100 plants. A new weekly report, called "The Atomic Energy Guideletter" is now available to industrialists at a cost of $40.00 for six months subscription or $75.00 for one year.

★ ★ ★

These letters cover the uses of radioisotopes in industry to control thickness of sheet materials, to measure thickness of coatings on base metals, to test defects in castings, to measure wear on cutting tools, to measure wear on motor commutators and to per-



Stand is zinc-plated steel strip 0.05 in. thick by 0.625 in. wide . . . made in steps A, B and C.

Top performance in

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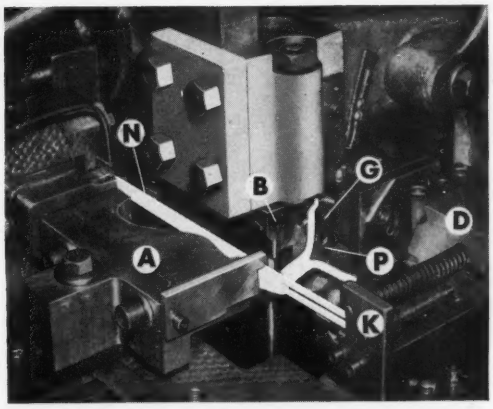
60 vaporizer stands per minute . . . automatically formed in one operation on an A. H. Nilson combination press and 4-slide. Kaz products are proof that clever product design, combined with precision tooling by Nilson, increases production and lowers costs.

Without obligation, Nilson provides specific forming recommendations from detailed information. Send for A. H. Nilson catalogue . . . the first step to increased production.



Final step in forming Kaz stands on Nilson 4-slide. Feet are spread, bent, crimped (G) with workpiece (P) on centerpost while next piece (N) is being cut off. Stop (K) on right slide (D) backs off after cut and workpiece (P) is wrapped around centerpost by die (A) when finished part is clear.

A.H. NILSON MACHINE COMPANY

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form many other jobs now done with other instruments.

★ ★ ★

With the subscription the company gives back copies of the letters without extra charge, the weekly reports and a question and answer service free. The subscription price will be refunded if the service does not meet with expectations.

★ ★ ★

Address inquiries to **The Atomic Energy Guideletter,** Evans Bldg., Washington 5, D. C.

Corrugated Boxes Replace Wooden Nail Kegs

T o u g h, compact, corrugated nail boxes, offering numerous advantages to manufacturer, jobber, and carpenter, have replaced traditional wooden nail kegs at **Wilson Steel & Wire Company,** Chicago.

★ ★ ★

The new Wilson "Nail Pak" is a three-piece telescope box designed for the best and most economical use of 350-lb. fibre-board by **Gaylord Container Corp.** 111 No. 4th St., St. Louis 2, Mo. It is shipped to the manufacturer in flat palletized loads which occupy less than 30% of the space formerly required for keg-type containers.

★ ★ ★

Assembly is done manually by an operator who forms the box

Showing Tear Tape on "Nail Pak" carton

halves on standard equipment and inserts "U" pads for bottom strength. The bottom unit is filled in a shaker, weighed, and glued on all sides before the top is telescoped into position; no strapping is required for closure.

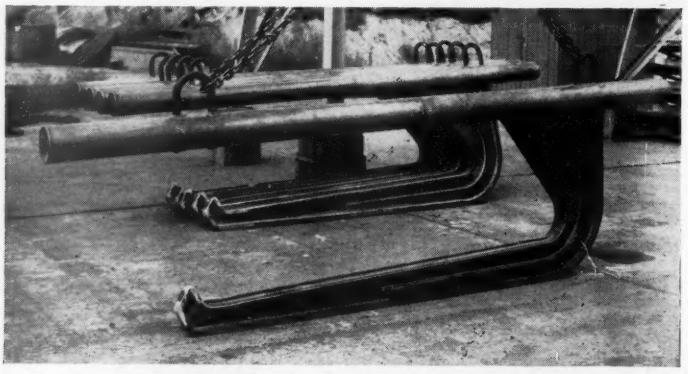
★ ★ ★

Filled and sealed, the box has three corrugated walls at every corner and affords smooth kraft surfaces for printing brand and product identification. Opening is made easy and positive by a convenient "tear tape", and hand holes are provided in top and bottom halves to aid in carrying.

★ ★ ★

Among the tested advantages of the new pack are: (1) Reduced storage space; (2) Improved stacking and handling; (3) Replaceable lids. This is the second major corrugated container to be adopted by Wilson Steel & Wire Company one of the first in its field to use fibre packages; the firm has shipped its regular coil wire in Gaylord "Drumpaks" since 1949.

Hairpins
THAT LIFT TWO TONS



WELDCO lightweight **hairpin hooks cut pickling costs . . . resist corrosion . . . last longer**

These hairpin pickling hooks, recently shipped to a leading Eastern wire mill, measure 14 feet in length, and each can handle 4200 pounds of coiled steel products at a time. Lightweight and unusually strong, the Weldco hooks are made of heavy, corrosion-resistant Monel plate. The spreader bars are of steel tubing, Monel-sheathed for maximum protection against strong pickling acids and fumes, and to keep scale or rust from falling onto the coil being processed.

Many wire mills throughout the country use Weldco hairpin hooks because of their excellent service record. Why not find out how these new, improved high-strength hooks can cut your costs? A phone call or letter will bring you complete information.

THE YOUNGSTOWN WELDING & ENGINEERING COMPANY
3782 OAKWOOD AVE. . . . . YOUNGSTOWN, OHIO

Heat Exchanger Unit Design Improved

A Camac Karbate Bayonet Heat Exchanger of improved design has been announced by **Carl Buck and Associates.** Heavy flanges have been eliminated, minimizing the area required for installation. Condensate is removed by a small internal steel pipe riser and the joint between header and Karbate tube is heavily fiberglass reinforced for greater strength.

★ ★ ★

Camac Karbate bayonets have an excellent rate of heat transfer hence units have large capacity in relation to size. They can be used for either cooling or heating or alternately for both, since Karbate is not affected by thermal shock. Units come in any length up to six feet.

★ ★ ★

Data sheets including capacity nomographs are available upon request from the manufacturer, Carl Buck & Associates, Essex Fells, N. J.

Nord Announces Improved Foot Control

The precision Di-Profiler, a tool widely used by tool and die makers for taking the hard work out of filing, honing, lapping, sanding, scraping, contour and "difficult-to-get-at" work, now has an improved foot control for controlling the stroke speed.

★ ★ ★

This control is a new "carbon type" rheostat that regulates the number of strokes of the Di-Profiler from 0 to 15,000 per minute. Designed for use with the tool, whether for reciprocating, oscillating or rotary action, this new feature provides the "delicate touch" that a tool maker needs to gain the ultimate in hand work precision with mechanical power.

★ ★ ★

The universal motor may be plugged into any 110-220 Volt receptacle and used continuously without overheating. The Di-Profiler itself has a compensation spring within the head extension that provides positive action without breakage on such work as finishing dead end holes or concavities.

★ ★ ★

Used widely for tool and die making, it serves as a virtually vibrationless tool for continuous production work in the finishing of precision parts, fine burr and imperfection removals, touch-up and carbide die sharpening.

★ ★ ★

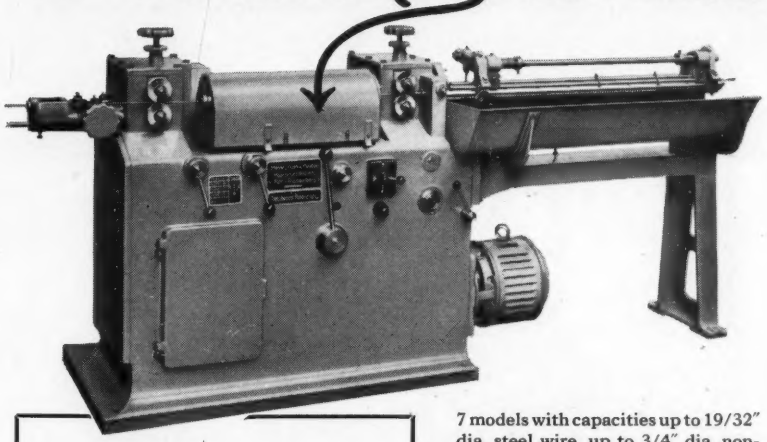
Harold Hedstrom, President of the company, states that a full line of attachments such as—angle tools, rotary heads and diamond files, wheels, saws, stones, hones, scrapers, sanders, lapping tools, lathe attachments and all the accessories that take the place of die-makers "special tools" are also available. Complete details will be submitted upon application to **Nord International Corp.,** 449 W. Central Ave., Orange, N. J.

Join The WIRE ASSOCIATION and work with others to improve the industry. Send for booklet.

MR&P

AUTOMATIC WIRE-STRAIGHTENER AND CUTTER

a little oscillation (here) makes a difference



Oscillation

The MR&P straightening jig rotates, of course, but it also oscillates while wire is being cut. This is done to protect the material against breakage. Ordinarily, the heat and stress which are produced by the rotation of the straightening jig would be concentrated in one section of wire during a cut-off, but thanks to oscillation, it is distributed instead. Thus, the wire is protected, which is very important when straightening fine or brittle wires.

7 models with capacities up to 19/32" dia. steel wire, up to 3/4" dia. non-ferrous.

6 feeding speeds, up to 230 ft. of straightened and cut wire per minute.

Accurate: wire cut 40" long has length and straightness tolerances within ±.005".

Straightening jig has 2 different speeds: 4000 rpm and 6000 rpm.

2 pairs of feed rollers permit proper feeding of all kinds and sizes of wire. Soft material is not marked or deformed because of special elastic feeding pressures.

When straightening extremely fine and easily fractured wires, automatic clutch can be supplied for disengaging feed rollers during cut-off.

Write for bulletin.

COSA *nationwide sales and service of precision machine tools—from bench lathes to boring mills.*

COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

Bethlehem Pacific Completes Steel Plant Modernization Providing Coast with Fully Integrated Wire Mill

(*Continued from page* 191)

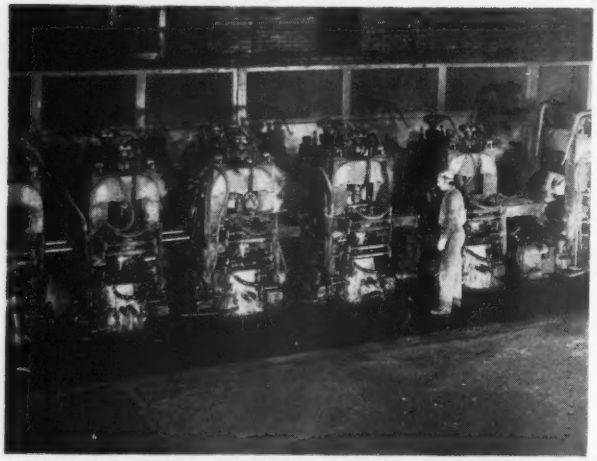
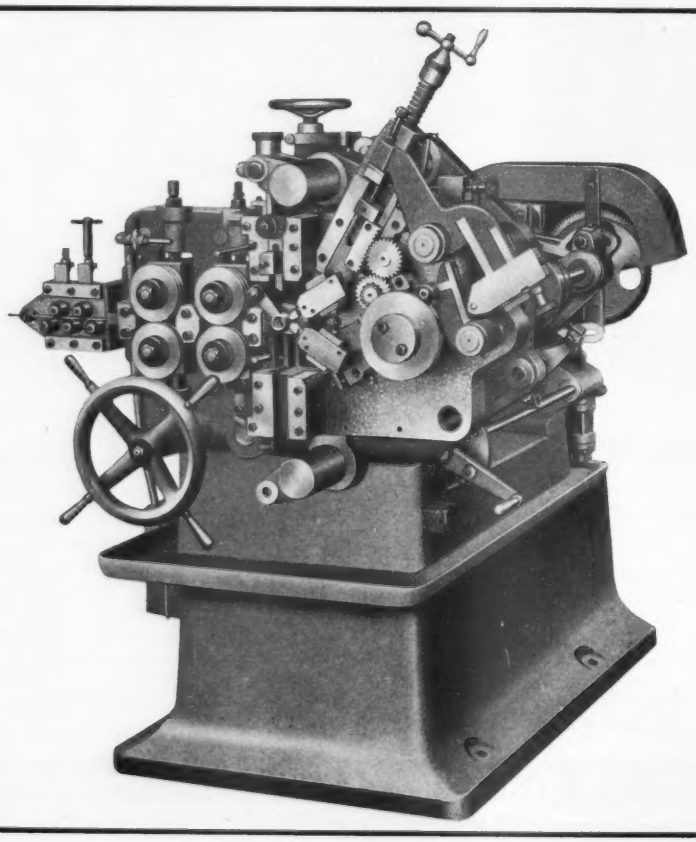


Fig. 5—On its way to the Wire Mill, new steel receives a high speed rolling on the 10-inch continuous Rod and Bar Mill, at finishing speed up to 42 miles per hour.

Fig. 6—Wire for the west is drawn to finished diameters on this battery of drawing blocks at the Bethlehem Pacific Los Angeles Wire Mill. Mill was first fully integrated wire production facility in the Southwest when opened in 1946—has since become a major producer.

And in providing Southern California manufacturers their needs in wire and wire products, the Los Angeles plant of Bethlehem Pacific has made a beneficial illustration to the industry of the value of a completely modern, efficient chain of production from raw material to finished wire.

cific in Los Angeles is taking up new positions of importance in western manufacturing processes.



UNIVERSAL AUTOMATIC SPRING COILING MACHINE

MODEL UFA-6

For wire diameters from .06″ to .24″. This machine will coil l.h. and r.h. extension and compression springs of cylindrical, conical and double conical patterns, as well as springs of other shapes.

MANUFACTURING PROGRAM

1. Automatic Universal Spring Coiling Machines (7 models) for wire diameters from approx. .0040″ to .55″.
2. Automatic Torsion Spring Coiling Machines (4 models) for wire diameters from approx. .0080″ to .2360″.
3. Loop End Bending Machines (6 models) for wire diameters from approx. .004″ to .39″.
4. Automatic Tension Spring Coiling Machines for wire diameters from .008″ to .08″.
5. Spring End Grinding Machines (3 models) for wire diameters from approx. .0116″ to 3/32″.
6. Flat Spring Coiling Machine for flat springs from approx. .315″ to .708″ wide.
7. Spring Knotting Machines for bedding and furniture springs for wire diameters from approx. .01″ to .177″.

KARL HACK • Maschinenbau

Reutlingen (Wurtt) Germany

Sole Agents:

HANCOR, INC.

INDUSTRIAL MACHINERY

260 MOTT ST. New York 12, N. Y.

Tel.: CAnal 6-0545

Report on the Elevated Temperature Properties of Selected Super-Strength Alloys

This is the third in a current series of reports prepared under the auspices of the Data and Publications Panel of the ASTM-ASME Joint Committee on the Effect of Temperature on the Properties of Metals.

★ ★ ★

Primarily this report is a graphic summary of the elevated-temperature strength data for 13 selected super-strength alloys. Included are 116 summary curves showing tensile strength; 0.2 per cent offset yield strength; per cent elongation and reduction of area; stresses for rupture in 100, 1000, 10,000 and 100,000 hr when available; and stresses for creep rates of 1 per cent in 10,000 and 100,000 hr.

★ ★ ★

Original data sheets (206 of them) appear in the body of the report directly following the curves. A brief description of each alloy is included which gives chemical composition, recommended heat treatment, and a few words about forging and machining. These alloy descriptions furnish the reader with a basis of comparison so that he can refer to the optimum processing conditions recommended by the producer of each alloy when using the data. It is not intended that these brief descriptions serve as a guide for using the alloys in production as complete information is available from the alloy producers upon request.

★ ★ ★

The Appendix contains some very-short-time rupture data for several of the alloys, and a compilation of chemical compositions for approximately 100 super-strength alloys.

★ ★ ★

Copies of this 8½ x 11-in., 208-page report with heavy paper cover can be obtained from the **American Society for Testing Materials,** 1916 Race St., Philadelphia 3, Pa. at $4.75 each.

Average Hourly Earnings Reach New High

The average hourly payroll cost of wage earners in the steel industry in the third quarter of 1954 reached a new high level at approximately $2.36, showing an increase of around 6 cents an hour over the average for the first half of the year. Increases in wage rates became generally effective July 1. The new contracts between the companies and the steel-workers' union, in addition to wages, provided for improvements in company-paid benefits for the employees.

★ ★ ★

The average of $2.36 in recent months is almost exactly $1 an hour higher than in 1946.

★ ★ ★

With the inclusion of the estimated cost of pensions, social security and insurance, the average hourly employment cost in third quarter would be in the neighborhood of $2.53.

Wafios
for every wire article
we supply the proper machine
AUTOMATICS
FOR THE WIRE TRADE
FULLY AUTOMATIC
BARBED WIRE MACHINE
for the manufacture of all commercially used types of Barbed Wire.
Sole Agents: Kurt Orban Co., Inc.
34 Exchange Place, Jersey City 2, N. J.
WAFIOS MASCHINENFABRIK REUTLINGEN 3 / GERMANY

Versatile Wire Annealing Furnace

(*Continued from page* 188)

From the circumference of this ring, gas inlet holes were drilled and tapped, fitting into each of the lateral holes and fitted with individual brass valves. At the exit side of the gas inlet ring, cold rolled steel tubes were threaded to within a half inch of the Inconel tubes, thus allowing free passage of gas into both tubes from the inlets. Both sets of tubes were tack welded together and formed a semi-rigid conformation to prevent any warpage of the Inconel under heating. A ring of ¾ inch copper tubing was fabricated with one inlet and six outlets spaced to connect up to the gas inlet holes in the brass connector. Using brass fittings and copper tubing, this ring was fitted into place around the gas inlet ring.

★ ★ ★

This entire assembly was placed with the Inconel side fitting into the glazed quartz tube and extend-

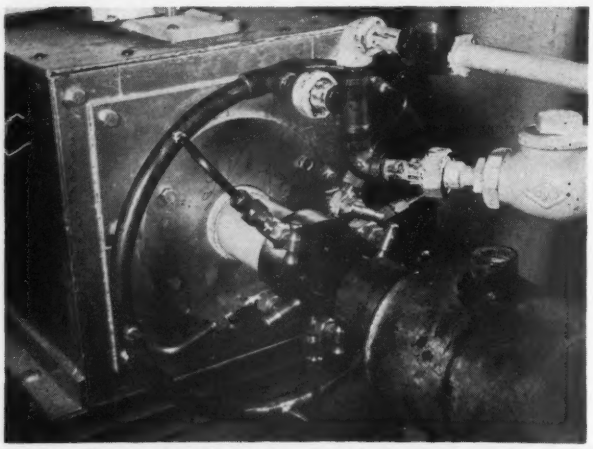


Photo 1: Close up of gas inlet ring.

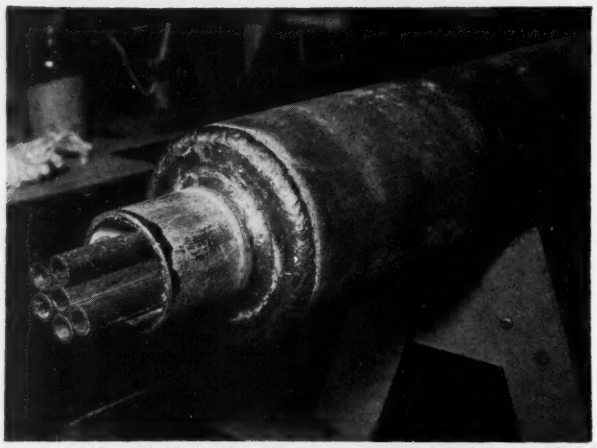
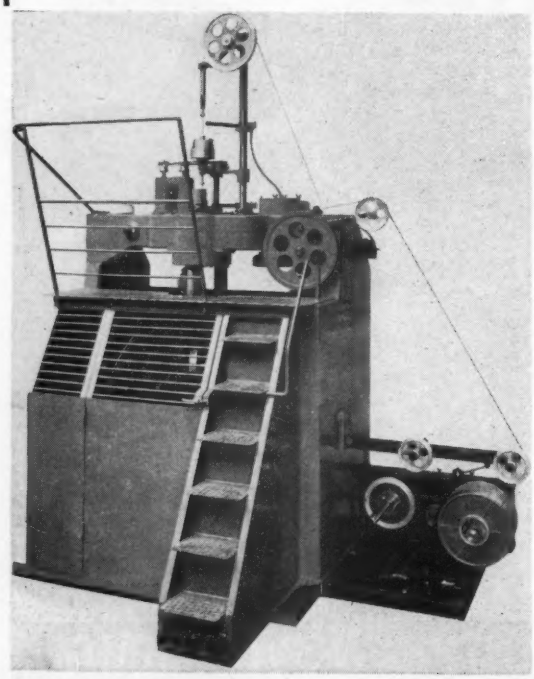


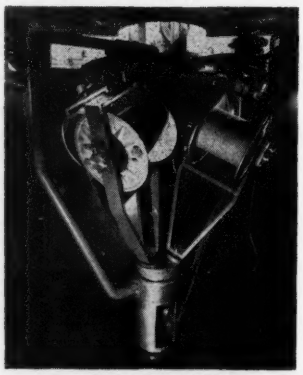
Photo 2: Exit view of furnace.

A New Machine . . .

THE POURTIER QUADDING MACHINE WITH HALF A DETORSION



- Automatic stop motion in case of breakage of paper or cotton, on a predeterminated length
- Compensator device controlling the unrolling of the feed-drums and the equality of tension of the four ends
- Double take-up: compensator motion controlling the tension of the quad. Transversal movement of the reels instead of traverse
- 2 lays per rotation of the flyer
- Special balancing capacity device
- Lays easy to reverse and to adjust
- Lockheed braked
- Automatic central lubrication
- Able to be used as a twinner
- Production: 500 lays per minute
- Feed-drums: maximum 16" (torsion) 14" (detorsion)
- Take-up reels: Maximum 18"
- Lays: from 1 to 7 lays per foot



Detail of Rapid Flyer

POURTIER MACHINES

153, rue Gallieni, ROMAINVILLE (Seine) FRANCE

ing some six inches beyond at the entrance end. A cooling chamber (E), three feet long, consisting of a two inch pipe welded into a six inch pipe, accommodates the cold rolled end of the assembly. Inasmuch as the total mass of wires going through the chamber can never be great, it is felt that this method of cooling would be more than ample. The entrance end of this "Gatling Gun" furnace will be covered by a flame curtain while the exit end will be completely surrounded by a sand trap. This same type alundum sand trap is being successfully used to bright anneal on a companion single tube furnace. An Alnor controller with a chromel-alumel couple placed against the quartz tube at the middle of the furnace is used for temperature control. A calibration curve will have to be ascertained due to the location of the couple, which was chosen to eliminate the possibility of loose wires or damage to the couple. Hydrogen, argon or nitrogen will be piped directly to the furnace, and an extra intake will be available for use of any special atmosphere desired. It is also conceivable to run several wires at one time at the same temperature, but with different atmospheres. Wires will be fed into the furnace by a multiple spool reel, and taken up at the exit end by a variable speed, multiple head take-up.

★ ★ ★

The above illustrates an inexpensive method of remodeling a furnace to increase its effectiveness by reducing time and manpower previously required.

New Portable Induction Heating Unit

Lepel High Frequency Laboratories, Inc., 55th St. and 37th Ave., Woodside, 77, N. Y., manufacturers of induction heating equipment, have developed a compact and completely self-contained high frequency heating unit combining an induction heating generator with a refrigerating water recirculator.

★ ★ ★

Some important advantages of this combination unit are:

1. **Can be easily moved about the plant to any location where it may be needed.**
2. **Eliminates the need for water supply and drainage connections.**
3. **Once filled, there is no water consumption at all since the water in the unit is constantly refrigerated and recirculated.**
4. **The high frequency generator is designed to permit the use of long flexible leads between the unit and the work coil. This feature is invaluable in cases where the work to be done is at a distance from the generator.**

★ ★ ★

This compact unit also can be used effectively for soldering, brazing and heat treating ferrous and non-ferrous metals.

★ ★ ★

Lepel Model RRP operates on 110 or 220 volts, single phase and contains a stepless Thyratron power control to easily select the proper power output. Because of its moderate price and versatile performance it effects great savings in almost any kind of manufacturing plant.

TO SELL—ADVERTISE IN
WIRE AND WIRE PRODUCTS
It pays—send for rates
453 Main St. Stamford, Conn.

THE NEW LOOK
IN DIAMOND DIES
This is what you have been waiting for!
It is the answer to lower production costs.
GET THE UTMOST LIFE AND SERVICE
FROM YOUR DIAMOND DRAWING DIES.
NATIONAL WIRE DIE CO.
PRESENTS
THE "NATDI"

The "NATDI" is a reversible Diamond Die.

We waited months for full proof, so that you could be sure of the new die's performance. Customer's report:

1. UP TO 100% MORE PRODUCTION AT THE INITIAL SIZE.
2. AMAZING ABILITY TO BE RE-CUT WITHOUT SKIPPING SIZES. THIS MEANS MORE RE-CUTS PER DIE.

Our representatives will gladly call on you at your convenience.

NATIONAL WIRE DIE CO.
30 Irving Place, New York 3, N. Y.
Telephones:
GRamercy 3-7622 & 7123

COMING . . .

THE WEST COAST REGIONAL MEETING OF THE WIRE ASSOCIATION

San Francisco, Cal., June 10, 1955.

Mark this date on your calendar now. The Program Committee is now formulating a program that will be worthy of your interest and especially hopes for a good attendance of Eastern wire men, who are cordially invited to come to the Coast for this annual Wire Association meeting.

THE PROGRAM COMMITTEE

General Chairman: WILLIAM MOHR, Wire Mill Supt., California Wire Cloth Co., So. San Francisco.
Committee Members: EARL R. POTTER, Pres. and Genl. Mgr., Industrial Wire Products Corp., Los Angeles;
JOSEPH F. CONLAN, Treas., K. H. Davis Wire and Cable Corp., Los Angeles;
STERLING EDWARDS, Pres., E. H. Edwards Company, So. San Francisco.

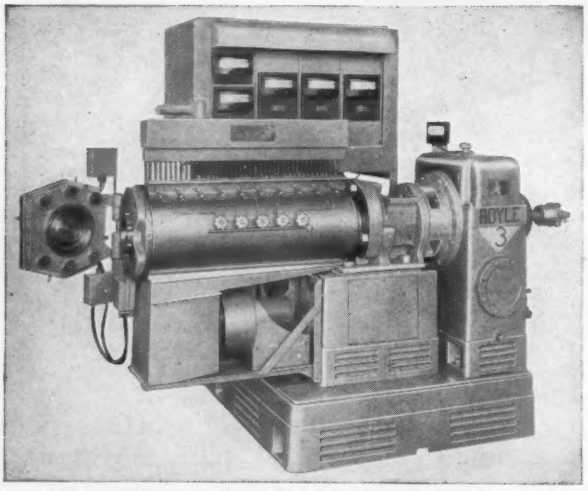
Besides the regular features, arrangements have been concluded to visit a wire mill and wire rope manufacturing plant in the San Francisco area. There is every promise of features of interest and value to wire men.

Full details will be given later.

THE WIRE ASSOCIATION

RICHARD E. BROWN, *Executive Secretary*
453 MAIN STREET STAMFORD, CONN.

FASTEST HEATING FASTEST COOLING



Here are some of the time-tested, money-saving reasons more and more plants are standardizing with Royle Spirod* Extruders for processes requiring maximum flexibility in controlled temperatures — constantly maintained and accurately zoned:

- **Extra heavy walled cast steel cylinders that will not warp. No joints to leak when pressures are high or crevices to collect burned compound that would cause contamination.**
- **Heavy duty large diameter heating elements, that can be used with 440 volts without step-down transformers, provide radiant heat to cylinders and heads.**
- **Any heating element may be removed and replaced without disturbing other elements or wiring.**
- **A cooling system with ten times the capacity of conventional designs can be modulated through its entire temperature range without drastic changes. Ample cooling for all compounds at maximum speeds.**

No. 3 Royle Spirod Extruder. Completely insulated and equipped for evaporative cooling.

*Patent Applied For

JOHN ROYLE & SONS

ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

PATERSON 3, NEW JERSEY

London, England	Home Office	Akron, Ohio	Los Angeles, Cal.
James Day (Machinery) Ltd.	V. M. Hovey J. W. VanRiper	J. C. Clinefelter	H. M. Royal, Inc.
REgent 2430	SHerwood 2-8262	SWandale 4-5020	LOgan 3261

Torque Motor Drives for The Wire Industry

(*Continued from page* 177)

cal drives while requiring little, if any, additional investment. They give the user:

Smooth, steady tension from empty to full reel.

Tension adjustment from any convenient location.

Tension settings, once selected, can be repeated easily and exactly.

Compact installation, with only the motor mounted at the reel stand.

Rugged, industrial class equipment.

No constantly wearing parts that must be serviced or replaced at frequent intervals.

Simple components and circuits that do not require specially trained personnel to adjust and maintain.

Operation direct from alternating current power source.

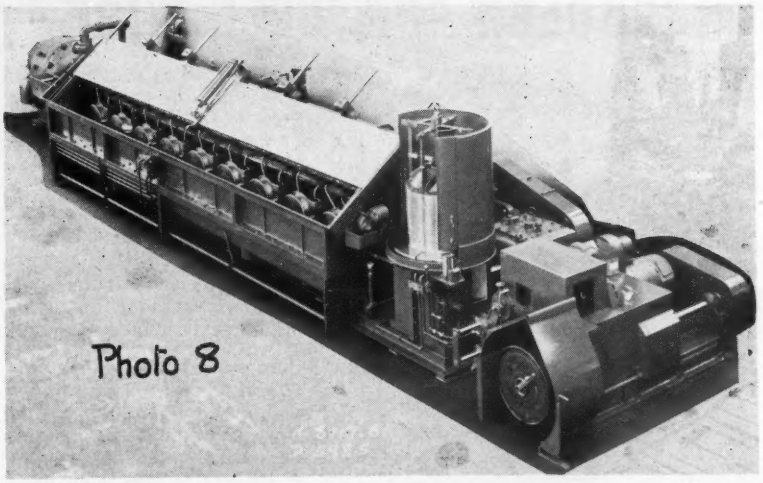
Very accurate tension control on special purpose equipment.

Low selling price.

Low installation expense.

Short shipment.

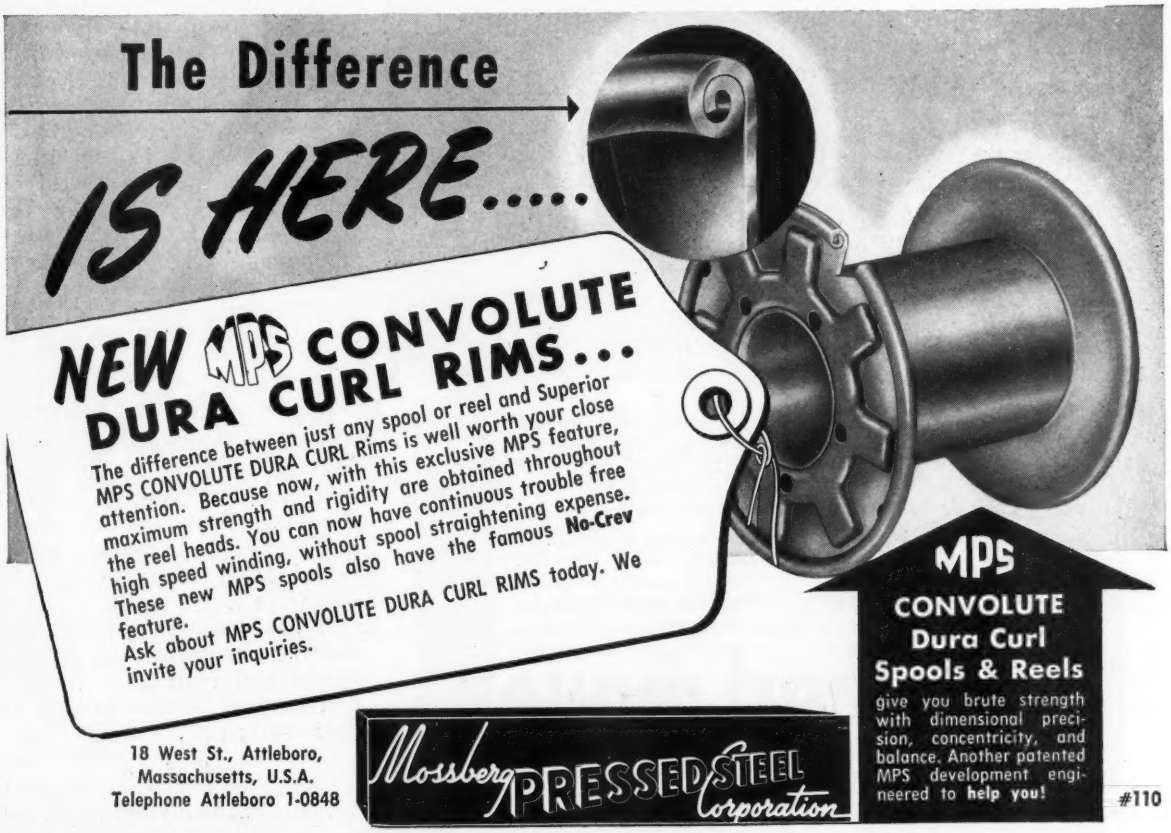
★ ★ ★



Wet type wire drawing machine take-up stand using frame 365 wound rotor torque motor for #6 to #14 AWG copper wire at 4000 fpm and less.

With these advantages, the torque motor has received wide acceptance in the wire industry, and there is every reason to believe the market for these drives will continue to increase.

★ ★ ★


The Difference
IS HERE.....
NEW MPS CONVOLUTE DURA CURL RIMS...
The difference between just any spool or reel and Superior MPS CONVOLUTE DURA CURL Rims is well worth your close attention. Because now, with this exclusive MPS feature, maximum strength and rigidity are obtained throughout the reel heads. You can now have continuous trouble free high speed winding, without spool straightening expense. These new MPS spools also have the famous No-Crev feature.
Ask about MPS CONVOLUTE DURA CURL RIMS today. We invite your inquiries.
MPS
CONVOLUTE
Dura Curl
Spools & Reels
give you brute strength with dimensional precision, concentricity, and balance. Another patented MPS development engineered to help you!
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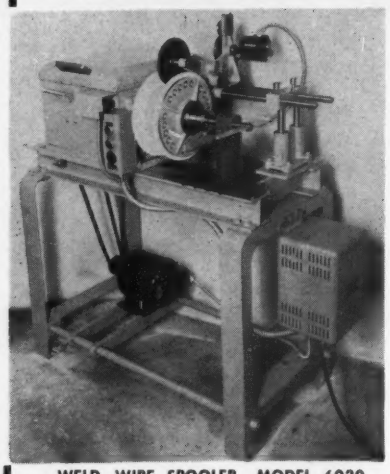
18 West St., Attleboro,
Massachusetts, U.S.A.
Telephone Attleboro 1-0848
Mossberg PRESSED STEEL Corporation

SPOOLER FOR WELD WIRE



WELD WIRE SPOOLER, MODEL 6030

THE BOYD 6030 SPOOLER

is designed for the thread layer winding of weld wire. The traverse mechanism is a single screw solenoid actuated for positive "No-dwell" reversing running in a constant shower of oil. Traverse lengths are easily adjusted from one-half to eight inches or longer if desired. Therefore, this machine can be used for other winding requirements.

Ball bearings throughout give free running and long life to all wear points.

Predetermining counter and measuring device provide automatic stop of wind at desired footage and hand operated clutch allows manual control.

The tailstock has a quick release action either hand or foot controlled.

The machine is powered by a motor with control for slow starting.

SPOOLING AND COILING MACHINES FOR ALL PURPOSES

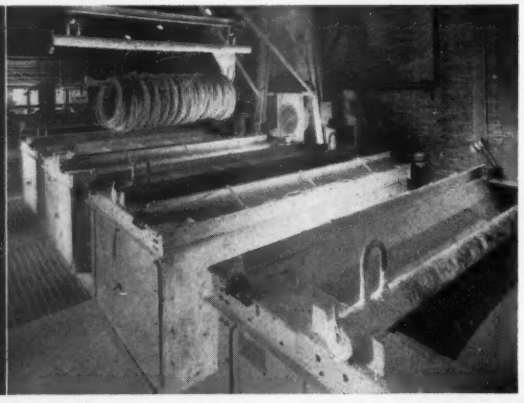
Send for full particulars

BOYD & SONS MANUFACTURING CORPORATION

1434-38 Callowhill St. • Philadelphia 30, Pa.

carl mayer

HI-SPEED REGISTERED **ROD BAKERS**



Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

Here are just a few of our many satisfied customers:

American Steel & Wire Co.
Atlas Steel Co.
Colorado Fuel & Iron Corp.
Crucible Steel Co. of America
B. Greening Wire Co., Ltd.
Indiana Steel & Wire Co.
Jones & Laughlin Steel Corp.
Republic Steel Corp.

Write for Bulletin No. 350

Patent Nos.
U. S. A. 2,296,361
2,323,828
2,235,559
Canada 396,144
401,589

THE **carl mayer** CORP.
3030 EUCLID AVE., CLEVELAND 15, OHIO

OTHER PRODUCTS: Core Ovens • Mold Ovens • Welding Rod Ovens • Heat Treating Ovens & Furnaces • Special Processing Equipment and Accessories.

Progress in "Koldwelding"

(*Continued from page* 179)

The buttwelding of Formex and enamel covered copper and aluminum wires is being successfully done by users of these tools. We recommend that the insulating covering be removed at the point where the cutting of the wire previous to welding is done. This is to prevent smearing of the insulating material across the cut surface by the passage of the cutter. We find that some of our users who are buttwelding formex covered soft aluminum wire do not remove the insulation first and they are still obtaining good welds. This is possible with sharp cutters and with aluminum wire. We do not find it satisfactory practice for copper.

★ ★ ★

In the buttwelding of small wires, the necessary accuracy of alignment and fit of the gripping surface of the dies is a very real practical limitation in the manufacture of suitable tools. Above diameters of .093 for copper and of .128 for aluminum, the force necessary to produce a weld gets beyond what can be expected of a manually operated tool. Manually operated tools are being used for aluminum wires up to .204 diameter but only in cases where the operator makes a weld once or twice an hour. Above these sizes and up to ⅜" diameter in aluminum or copper, hydraulic powered tools have been provided that can do a neater job than can be expected with a manual tool.

★ ★ ★

The manually operated hand buttwelder, produces a complete weld in from 12 to 20 seconds. The hydraulic powered welder in from 20 to 30 seconds whereas for very high production requirements, buttwelding wires of any size from .020 to .375, or of any wire shape or strip, power press welding apparatus has been designed and built with which an operator can produce several hundred welds per hour.

★ ★ ★

While manually operated butt-

welding tools will handle the field of copper and aluminum wires and some strips within their size limitations, it is to be expected that metals and alloys more difficult to weld will eventually yield to the power press tools where an unlimited amount of power uniformly applied is available. The English have successfully welded mild steel and Titanium on a laboratory scale. Our own experiments indicate that if we are to make this extension of the field of cold welding a practical application that it will have to be done by power tooling.

★ ★ ★

Cold welding of flat wires or strips by power driven attachments to the stock feed mechanism of stamping presses and wire forming machines have been designed and are available from Utica for the special applications which require them.

★ ★ ★

The lapwelding of sheet aluminum, copper or brass parts by means of our lapwelding tools is practiced in a number of applications.

★ ★ ★

The sealing of capillary tubes in instrument work and in the production of vacuum apparatus is successfully accomplished by the use of the lapwelding tools fitted with special dies.

★ ★ ★

The lapwelding of copper connection strips to strap aluminum transformer coils in electrical apparatus has been successfully done resulting in the use of the lower cost aluminum windings and retaining the accustomed means of making electrical connections to the copper ends.

★ ★ ★

The lapwelding of foils and thin strip as used for cable sheathing with these tools is now general practice in a number of wire and cable plants.

★ ★ ★

Cold welding of very thin materials seems to depart somewhat from the usual formulae. In very thin forms, we can often obtain

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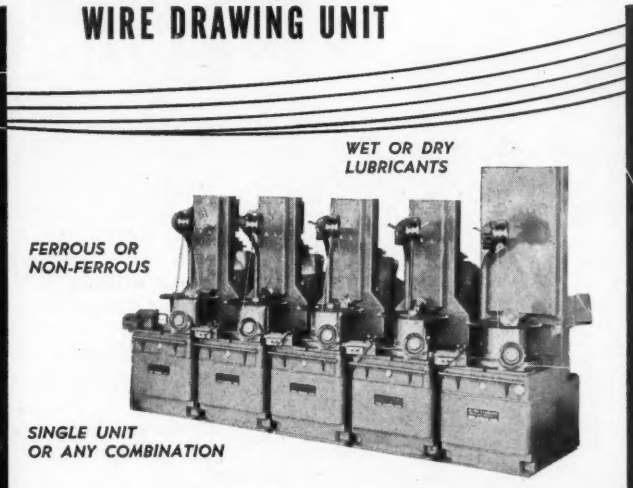

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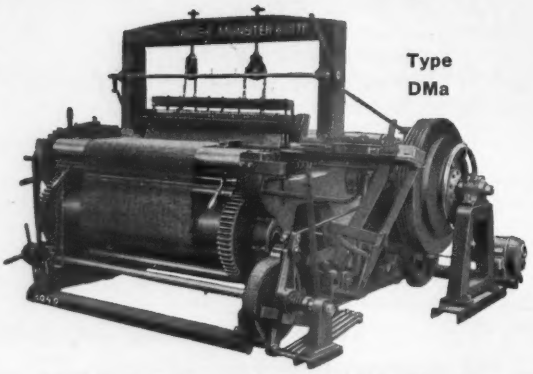
Wire Crimpers for wires up to 5/8" dia.



Type DMa

Weaving Range 1 to 20 mesh per inch with wires up to .100". When used semi-automatically, meshes with wires up to .240" dia. can be woven.

We have a complete line of Looms from the coarsest mesh up to 450 mesh per inch.

For further information write us giving details.

CEDAR WEST TOOL COMPANY, INC.

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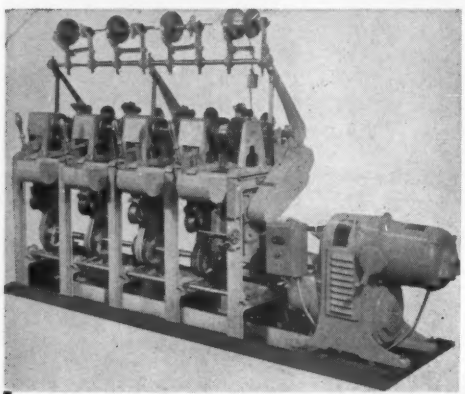

1900-HV MULTIPLE SPINDLE SPOOLER

SPECIFICATIONS
Size Range: .010" to .080" or heavier if soft and many flat wire sizes.
Max. Spool Size: 16" flange diameter.
Capacity: usually 4 to 8 spindles.

The 1900-HV Spooler is a rigid, precision machine which will consistently produce a uniform, dense wire lay. Both the traverse and spindle drives are regulated through wide-range, stepless, variable speed units, eliminating change gears. The 1900-HV is completely adaptable to your particular constant or changing demands. All controls are positive. Adjustments are made accurately with the spooler in operation and without tools.

Both smooth acceleration and rapid stopping is obtained through a single lever at each station. Spool changing is simple and rapid. Anti-friction bearings are used on all shafting and spindles.

Your special requirements can be incorporated into the design. Each machine is delivered ready for operation from your power supply. Payoff stands furnished as extras.

Consult us on your spooling problems.

ROBERT J. EMORY COMPANY

31 East Runyon Street Newark 5, N. J.

excellent welds on brasses, bronzes and alloys which do not give satisfactory welds under any circumstances in thicker sheets or in wires.

★ ★ ★

Welding fine wires to thin tabs or even to certain types of printed circuitry is entirely feasible in either aluminum or copper. Cold welding in these forms offers possibilities of eliminating soldering operations from electronic assemblies and of greatly reducing costs of labor in such assemblies.

★ ★ ★

Cold welding of foils and of connecting tabs to foils is now in production by condenser manufacturers.

★ ★ ★

Further extensions of cold welding are into the field of welding the fins onto tubing to make the finned radiation tubing commonly used in air conditioning and heating.

★ ★ ★

Means for the buttwelding of aluminum and copper tubing by the cold welding process is available in hydraulic operated power tools fitted with the special equipment required to weld tubing.

★ ★ ★

There is now available for the wire industry a line of tools which will join aluminum and copper rod and wire which have been well tested under actual industry conditions and which will produce uniform, strong and easily cleaned welds.

Armco Improving Equipment

Armco Steel Corp., Middletown, Ohio, have announced that they will spend approximately $30,000,000 to improve their plants and equipment in 1955. This expenditure will equal what was spent in the two preceding years and is undertaken, President **W. W. Sebald** states, because of their confidence in the continuing prosperity of America and their conviction that businesswise, the country is on a sound basis.

Fatigue Life of Stranded Hook-Up Wire

(*Continued from page* 185)

There appears to be a definite advantage to a large number of fine strands although the improvement levels off at some point. Enough work has not yet been done to determine where this point occurs for various sizes. The 105 strands of #38 were tested with several thicknesses of insulation with no significant difference in number of bends before failure.

★ ★ ★

In this paper all values reported are averages of at least six different readings. The individual readings did not vary widely although in some cases where soldering was involved the spread was increased slightly. The data, of course, is reliable only to the extent that the test conditions represent the service in the field.

★ ★ ★

The connectors studied were only used to determine principles involved. Since there are hundreds of terminals available from several manufacturers an exhaustive study of this problem was not attempted. Undoubtedly there are connectors available which will give better results than the relatively simple types used in these tests.

★ ★ ★

A great deal of work still remains to be done. In view of the data shown in table VII further study of beryllium copper and copperweld is warranted. Samples are now being prepared to continue the work started on the #18 wire by finding the optimum lay length and extending the studies to other conductor sizes for this type of flexing service. Some of the results of this paper have been found useful in practice but a great deal more information from the field is necessary to determine how well these tests simulate the actual service conditions to which the wire is subjected. This type of information is slowly being accumulated with the hope that the most suitable materials may be applied in the optimum construction for any particular application.

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THREE-WIRE HEAVY DUTY TWISTING MACHINE
Built to handle wire from #14 to 500,000 circular mils in size on cradle reels.
Cradle reels either 30", 36" or 48" in diameter.
Rotor speeds from 800 r.p.m. to 30 r.p.m. controlled by gear box and dual drive.
Capstans either single with fleeter sheave as shown or double with diameters of 30", 36" or 42". Rates of lay from 1½" to 36".
Welded steel frame, anti-friction bearings and multiple roll guides. The machine is designed and built to our usual high standards.
Exceedingly versatile and efficient machine.
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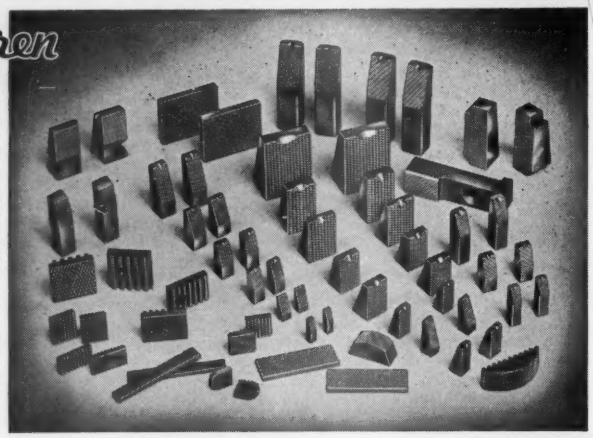

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Over thirty years of successful experience with leading wire manufacturers provide the greatest assurance of better production with PERMAG wire drawing compounds.

Formulated in the Magnuson laboratories for guaranteed peak performance, PERMAG compounds consistently prove themselves ideal for all types of wire drawing, for both production and economy.

FOR WIRE CLEANING, too, PERMAG offers a group of completely tested formulas that will eliminate pickling trouble and speed drawing production.

A Magnuson representative will be glad to demonstrate the proven superiority of PERMAG cleaning compounds. Or, if you wish, a letter will bring you a complete analysis of your problem, without obligation.

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50 COURT ST., BROOKLYN 1, N. Y.
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Reversible Diamond Die Proves Success in Field

In September 1954, the **National Wire Die Co.**, 30 Irving Place, New York City, announced the end of a six month test of their "NATDI", the reversible diamond die.

★ ★ ★

The test was conducted in plants of their customers, under normal operating conditions, on various types of wire ranging from stainless steel down to soft copper and aluminum. When all proof was in of the greatly increased productivity of this die, the "NATDI" was put on the market.

★ ★ ★

Since that time in last September, inquiries have poured in. Trial orders and reorders have been completed and shipped. To date, none but satisfactory and complimentory reports have been received.

★ ★ ★

Until "NATDI", most emphasis was placed on the front end of the die. When the front reduction angle became worn, the wire entering the bearing became mauled, thus deteriorating the bearing much sooner than a good reduction angle would allow. The obvious thing to do then was to recut to a new size.

★ ★ ★

The advantages as expressed by the users of "NATDI" are as follows:

Extended initial size production of up to and in many cases over 100%. This is due to the fact that with "NATDI", when the front reduction angle starts showing its first sign of wear, the user will note that the bearing or drawing channel is still in good condition, thus before any abuse of the bearing takes place, the die is reversed. The wire is now being drawn on a brand new reduction angle and the unabused bearing can continue producing wire for quite an extended length of time; i e., if expectations are 10,000 pounds on the initial size, reverse the die after drawing 7,000 pounds and continue drawing, thereby, gaining another 7,000 lbs. Upon inspection of the "NATDI", if the size and condition of the wire still meets with specifications once again reverse the die and draw from the original front.

★ ★ ★

When recutting becomes necessary the user knows how often die sizes are skipped in order to eliminate the worn

area, or pressure ring from the reduction angle. Therefore, the benefit of having TWO SIDES to choose from is readily understandable. The possibility of more recuts per die is easily seen.

★ ★ ★

At present "NATDI'S" are being produced in sizes .0079 and up. Below this size a well blended and polished rear approach is maintained, but the die can not be considered reversible.

★ ★ ★

Further information about the "NATDI" can be obtained from the company.

Electric Wire Company Sold

The Eastern Insulated Wire Corporation, Wallingford, Conn., is now operating under the ownership of the **Circle F. Manufacturing Company** of Trenton, N. J. The sale of the firm has been confirmed by **Herman B. Ring,** president of Circle F. The latter organization has announced plans of producing wiring and electrical devices for industrial and home appliance use.

★ ★ ★

It has been announced by **Edward A. Ring,** vice president of the new parent organization, that the present managerial setup would remain unchanged with **Lawrence Feldman** as general manager and **Edward Cooke** as factory manager.

★ ★ ★

Plans have been revealed indicating an expansion of the plant in Wallingford and an increase in the sales force as a preliminary to the expansion program.

Wire and Cable Company on 1955 List of Best Managed Companies

An insulated wire and cable company has been awarded a Certificate of Management Excellence for 1954 in the sixth annual management survey by the **American Institute of Management.**

★ ★ ★

The Okonite Company, Passaic, N. J., is among the 379 American and Canadian firms receiving the management citation after a continuing study of thousands of companies.

★ ★ ★

Jackson Martindell, President of

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CRITICAL CUSTOMERS

For the past ten years we have specialized in the compounding of Vinyl extrusion and injection molding compounds to specifications, or developing compounds for a specific use.

Underwriters' approved standard compounds are available in all colors for POT, T, TW, 80 Degree C, 90 Degree C and 105 Degree C wires.

If you require a Vinyl compound rated higher than 105 degrees C for special applications, we suggest you communicate with us, as we may have a compound to meet your requirements.

Your inquiries are invited.

ELECTRONIC RUBBER COMPANY

69 Sunnyside Ave. • Stamford, Conn.

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Sheffield Manufacturers Wire is drawn from steel made from furnace to finished product in Sheffield's own mills. Quality is checked and guarded at every step. Perfect uniformity and accuracy of gauge are assured, for greatest efficiency in your operation.

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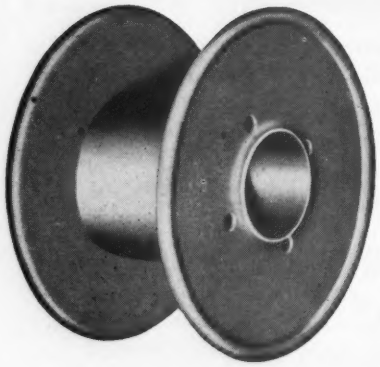

Industry's tireless search for greater efficiency is constantly posing new problems in high speed for the wire industry. This has underscored, as never before, the need for correct design and careful construction of reels for wire drawing machines.

For over a half century, Apco Mossberg has produced reels of highest quality. Apco Mossberg High Speed Reels are manufactured to extremely close tolerances — with particular emphasis on trueness and balance.

Here's something else. It's standard practice at Apco Mossberg to give each and every inquiry about steel reels, spools or bobbins individual attention. Bring your next problem to Apco Mossberg. Without obligation, an Apco trained engineer will be glad to offer suggestions and solutions to your particular problems. Write for further details.

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ATTLEBORO, MASS.

the research foundation, stated that the announcement achievements of these companies is not only to give credit where due, but also to further the founding purpose of the Institute. That is, to penetrate with scientific method what makes for management excellence and to make those qualities more accessible and widely understood by all.

★ ★ ★

The Institute is a non-profit foundation established for research and improvement of the management profession. The full list of companies awarded certificates for 1954 will be published in February. Copies of the study will also be available to the public through A. I. M. headquarters at 125 East 38th Street, New York.

Electric Wire Concern Building New Wing

Construction is nearing completion on a new wing on the plant of the **Plastic Wire and Cable Corp.**, Jewett City, Conn., which will be used largely for handling Government contracts, according to a recent announcement by company officials.

World's Largest Aluminum Reduction Cell

The largest reduction cell ever operated in a commercial line producing aluminum is used in the two reduction plants recently built by **Reynolds Metals Company** to meet the increased demands for primary aluminum, according to an announcement by **J. Louis Reynolds,** Vice President in charge of operations. These two facilities are the San Patricio Plant, near Corpus Christi, Texas, with a rated capacity of 160,000,000 pounds of aluminum per year, and the Robert P. Patterson Plant at Arkadelphia, Arkansas, with a capacity of 110,000,000 pounds yearly.

★ ★ ★

Experimental development on this cell was nearing completion at the outbreak of the Korean War. It is from two to six times the size of other units now in use in this country. Each unit has a daily production of approximately

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Double your Refinished Tungsten Carbide Die Production

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The Standard of the Wire Industry

SAME CHILD,
NEW PARENTS

Nelco

It wasn't so long ago that NELCO grew up and we proudly announced to the world that our lacquer had been christened with that name. We mentioned the many sides to NELCO's character such as the NELCO for vinyl insulated hook-up wire, the NELCO for electrical tubing, the NELCO for aircraft low tension wire, and many others.

We have been most pleased by the market's reception of NELCO. As NELCO continues to grow and diversify, we're sure our customers will be increasingly interested in its many possibilities.

To facilitate NELCO's growth and ease the parental discipline, the former parents, New England Lacquer Company, have combined their efforts with the Chemical Products Corporation. In fact. it's still the same child—with new parents.

The NELCO name will be retained and so will the famous NELCO trademark shown above. And your problems with cable coatings and saturants will be tackled by an increased staff working with greater facilities. We welcome the toughest problems you have.

Chemical Products
CORPORATION
King Philip Rd., East Providence, R. I.

2,000 pounds of high grade aluminum. Each must be fed at a daily rate of 4,000 pounds of alumina (aluminum oxide) and approximately 1,000 pounds of carbon anode material. The reduction cell is of the Soederberg type and required over 90,000 pounds of steel in the fabrication of the shell and superstructure frame.

★ ★ ★

The power source of such a line must have a direct current capacity of approximately 100,000 KW, which is enough to supply a city of 300,000 population.

New Steelweld Line of Single-Point Presses

Continuing its expansion in the heavy press field, **The Cleveland Crane & Engineering Co.,** Wickliffe, Ohio, is now introducing a line of twin geared Steelweld Single-Point Presses of the straight-side tie-rod type.

★ ★ ★

The machines, which are mechanically powered, are of the welded steel construction and incorporate the latest advances in design for safety and dependability. These include a low inertia air-operated clutch and brake unit; barrel - type adjustment; non - metallic, non-scoring guides; automatic lubrication. Air cushions are designed with the cylinder opening downward to prevent foreign materials from working in.

★ ★ ★

Sizes developed range from 150 to 500 tons and have bolster areas of 30 x 36 inches to 42 x 48 inches. Operating speeds are from 10 to 20 strokes per minute. Presses with other specifications will be engineered to suit specific requirements.

Announces New Nickel Alloy Wall Chart

The engineering properties of Nickel Alloy Wire, Rod and Strip are presented in this convenient wall chart which folds into a neat, 8½ x 11" booklet. Dimensions of the chart when unfolded are 17" x 22". It is designed to help engineers select the right Nickel Alloy

H-D

BUNCHING
(TWISTING)
AND
STRANDING
IN THE WIRE AND
GENERAL MANUFACTURING
PROCESSES

SPECIALIZED
ENGINEERING
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Expanding application of twisting principles to the production of many products is reflected by an ever-increasing demand for both H-D standard equipment as well as machines especially engineered to solve varied production problems. Week after week surprising new uses are developed through the close cooperation of our engineering department with manufacturers in many fields.

Write today for our New Technical Bulletins. Tell us what you make—or contemplate making and your inquiry will receive prompt attention.

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STAPLES PER MINUTE!!!
are made on the
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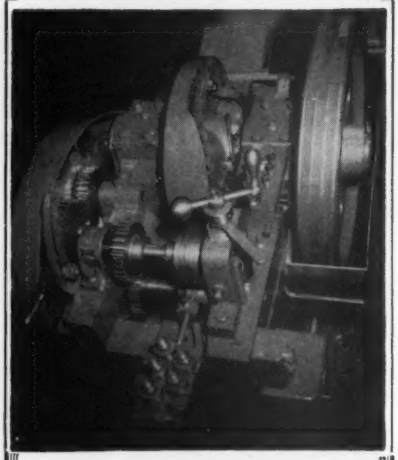

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in Wire, Rod and Strip form for their specific products.

★ ★ ★

Materials whose properties are described include Nickel, Monel, Inconel, Incoloy, and Nickel-Clad Copper. The chart is printed on heavy, durable paper with a dull finish to eliminate glare.

★ ★ ★

Nickel Alloy Wire, Rod and Strip are used for many end products in the mechanical, electronic, chemical and consumer fields. Applications include springs, fasteners, wire cloths, screening, electronic grids, cathodes and other tube components, electronic weatherstrip and wire forms.

★ ★ ★

Charts can be obtained by writing to **E. H. Mann, Alloy Metal Wire Division, H. K. Porter Company, Inc.,** Prospect Park, Pennsylvania.

Appointed Sales Manager of Wire Cloth Concern

James G. McGinnis has been appointed Sales Manager of **Audubon Wire Cloth Company,** Philadelphia, Pa., to take the place formerly occupied by **Raymond J. Guba,** who passed on last year.

Yarn Concern Moves to Bethlehem

The Synthetic Thread Corp. recently moved its plant from Brooklyn, N. Y., to 238 W. Goepp St., Bethlehem, Pa.

★ ★ ★

This move, company officials state, is to enlarge their plant facilities and to integrate their operations by having all twisting, winding and other yarn processing work done under one roof. This also will facilitate further their quality control and inspection work and serves to insure the highest qualities in the products furnished to their customers.

★ ★ ★

The company dyes and processes yarns of Viscose Rayon, Acetate Rayon, Cordura, Nylon, Dacron,

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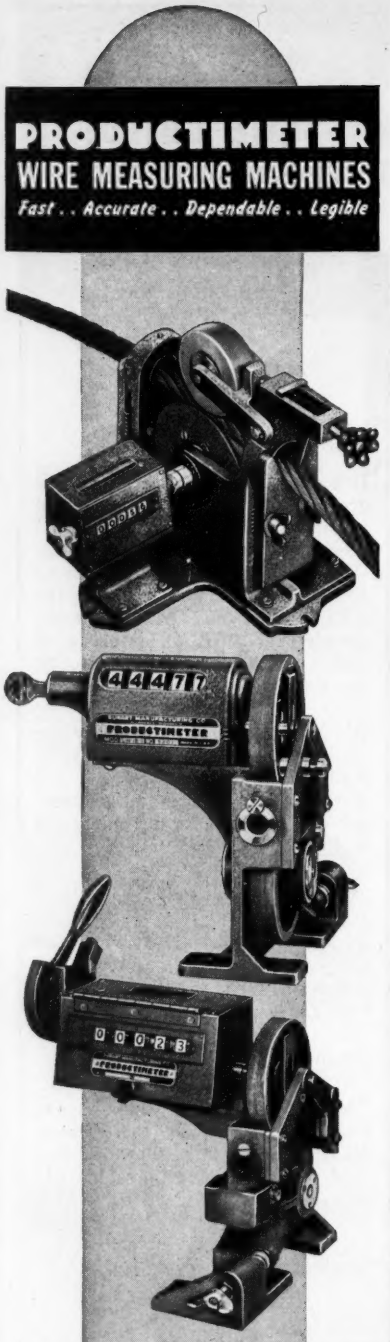
WIRE MEASURING MACHINES
Fast . . Accurate . . Dependable . . Legible



Productimeters measure all types of wire from .010 to 1½ inches in diameter . . . at speeds up to 5,000 feet per minute. They eliminate "guess-work". . . insure profitable operation in your plant.

Send for Catalog No. 40

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PRODUCTIMETERS SINCE 1879 *Count Everything*

MASON STYLE
NON-RETURNABLE
METAL SPOOLS
PLAIN COATED OR
LITHOGRAPHED TO
YOUR SPECIFICATIONS
SIZES 5" DIA. FLANGE
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LOW COST
— MASS PRODUCED BY MODERN METHODS
— WE DO OUR OWN LITHOGRAPHY

QUALITY
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— THE BEST

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BRANCH PLANT
Greenville, Ohio

Orlon, Fortison and Cotton for the electric wire trade, supplying these yarns in standard or specially wound packages, as customers may desire. In its many years of this specializing as the needs of wire and cable manufacturers, they have expanded steadily and anticipate, in this latest development, a greatly increased opportunity to serve their field with better-than-ever yarns.

Wire Company Marks 50th Anniversary

1955 is the 50th birthday of **Seneca Wire and Manufacturing Company**, Fostoria, Ohio.

★ ★ ★

The company through its president **H. A. Blaser**, and its vice president **H. L. Martin**, expresses its appreciation to its many customers for the contributions to its growth and success and takes the opportunity to extend their best wishes for a prosperous New Year.

Rustripper Featured at Metal Shows in Los Angeles

Oakite Rustripper, the recently announced alkaline deruster, will be featured by **Oakite Products, Inc.**, at the ASTE Western Industrial Exposition and the ASM Western Metal Exposition in Los Angeles in March.

★ ★ ★

Designed primarily for the removal of rust and heat scale from parts where dimensional change and acid embrittlement must be avoided, Oakite Rustripper is said to reduce rust removal operations from six steps to two, requiring only an alkaline soak and a rinse. It is said to save water, materials, equipment, space; and to have long life in solution. According to the manufacturers, there is no danger of over-immersion—once the rust is removed, all action stops. The material may be applied in several ways — in hot or cold solutions, with or without cyanide, and with or without current. The material has proved its versatility by its use to remove light heat scale from titanium, strip tough paint coatings, clean molds, reclaim rejected pieces.

SIX ADVANTAGES from just ONE DIP!
COAT WITH
BORAX 5 MOL.
Here are the advantages you get when your stock is Borax-coated...
1. FASTER ACID NEUTRALIZING
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3. FASTER BUTT WELDING
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5. LONGER STORAGE SAFETY
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One dip puts on a Borax coat that is tight, yet pliable, and dries in a few minutes. It provides a good vehicle for your drawing lubricant and won't flake off. Borax-coated rods are a lot cleaner to handle in transit and are protected from rust while in storage. Try BORAX or BORAX 5 MOL on your stock!
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UTICA® POW'R PLI'RS™

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Gives Shearing Power with Ease while cutting up to 5/32" steel drill rod.

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These cam action, high leverage cutters slice through heavy steel wire with an ease that will amaze you! They stay sharp, too – for these cutters are forged, hand-honed and *extra*-hardened by electronic induction. Handles are heat treated pressed steel.

For full information on this and other fine UTICA® tools, ask your industrial distributor!

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In Canada: Adlam Tool & Supply Co., Ltd., Montreal

Carbide Business Outlook

Carbide business is expected to be "substantially better" in 1955 because of three factors—inventories, defense spending, and general business upturn—according to the general manager of the **General Electric Company's Carboloy Department, K. R. Beardslee.**

★ ★ ★

He stated that carbide inventories were high during most of 1954, due to the decreased production, particularly in the early part of the year. From all indications, Mr. Beardslee said, these high inventories have been worked off and we will move from decumulation to accumulation.

★ ★ ★

He also pointed out that defense spending, a volume user of carbides, will probably increase during 1955. These two factors coupled with the general upturn in business which is anticipated and is already apparent in some fields, should be translated into a healthy year for the carbide industry.

Straightening and Cutting Small Diameter Wires

Short lengths of wire from one to 12 inches long and up to ⅛-inch in diameter are straightened and cut to size accurately and quickly by the Lewis No. 7 wire machine, manufactured by **The Lewis Machine Co.**, designers and builders of all types of wire straightening and cutting machinery for more than forty years.

★ ★ ★

The Lewis No. 7 wire machine can be hand operated for production of small quantities of wire, or belt or motor driven for increased production. Graduated scale simplifies adjustment to produce any desired length of wire. Wire on reel adjustable to any size coil is fed through machine by reciprocating feed clutch and automatically straightened and cut to length. Clutch is made from semi-steel, with hardened steel jaws to grip wire. Wire is straightened by ten-roll straightener. Knife is operated by cam on flywheel shaft.

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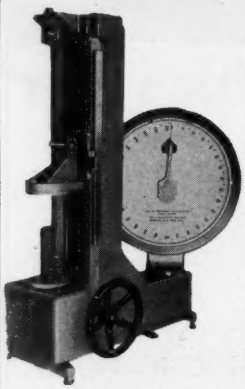

Model SF 21 T Table model for the testing of tension and compression springs. Indication on vernier measuring bars — Stop for serial testing — Hand-operated via spindle or motor drive.

Ranges from 100 kg to 1000 kg.

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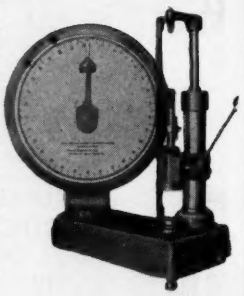

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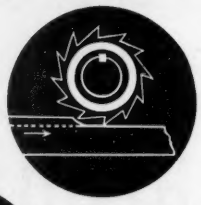
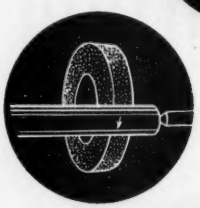
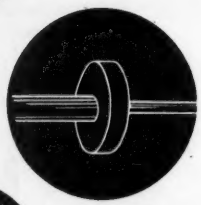


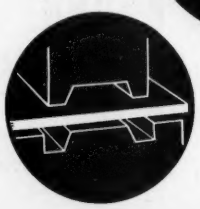
MILLING



GRINDING



DRAWING



STAMPING

Take up your lubricant problem with Hans C. Bick and discover how you can reduce costs through increased production and longer life for tools, dies, and abrasives. Bick lubricants and coolants are modern compounds developed by specialists with 23 years' experience. To assure best results, our engineering service is always available to work with you in a friendly, cooperative way. If you machine, form, or grind ferrous and non-ferrous metals, call upon Hans C. Bick now to smooth the way for lower unit costs.

Hans C. Bick, INC.

READING, PENNSYLVANIA

Hardened steel roller in knife holder runs on cam.

★ ★ ★

The Lewis No. 7 wire machine is simple to set up, easy to operate and affords maximum versatility in all industrial operations. Practicality and durability have been proven in extensive use by foundries in the preparation of core wire and in many other industries. Other models of Lewis wire straightening and cutting machines, with stationary cutoff or with flying shear, and with selection of feed speeds, are available for straightening and/or cutting material up to ¾-inch in diameter.

★ ★ ★

For additional information on Lewis wire straightening and cutting machines, write The Lewis Machine Co., Department 1A, 3441 East 76th Street, Cleveland 27, Ohio.

New Oxide Inhibiting Coating

Development of a new water-displacing and oxide inhibiting coating for copper or silver printed circuits, brass and copper pins, discs, switches, commutators, etc., has been announced by the **London Chemical Company, Inc.**

★ ★ ★

Known as Sealbrite 10 x 1, the new compound is said to remove moisture or water instantly and protect clean, bright surfaces for long periods of time without affecting the lustre or dimension of the parts, yet does not have to be removed before further processing or soldering, or before end use of the product by the ultimate consumer.

★ ★ ★

The transparent, dry film of Sealbrite 10 x 1 is said to have withstood 95% relative humidity at 40°C for 100 hours on printed circuits, switches, commutators, shaver heads and cutters, razor blades, instruments, sewing machine parts, etc.

★ ★ ★

For complete information or samples write to the London Chemical Company, Inc., 1535 N. 31st Ave., Melrose Park, Ill.

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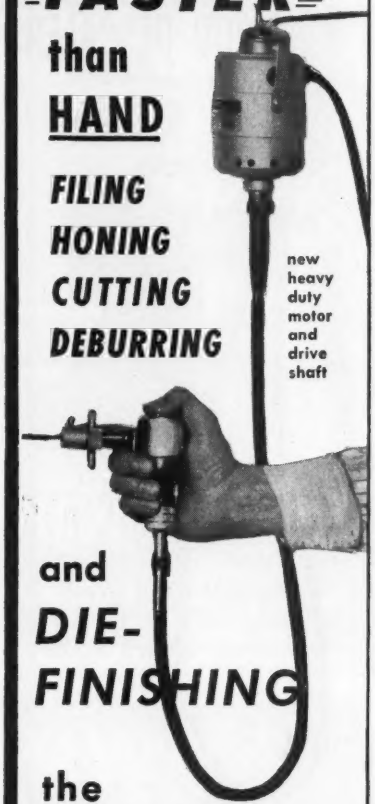

and DIE-FINISHING

the Di-Profiler TRADEMARK

This is the ORIGINAL "improved" motor driven die filing and cutting tool that speeds up the tool makers' fine work. It takes the hard work out of die-finishing providing from 0 to 15,000 reciprocating strokes per minute with foot control.

Tests have proven that this precision tool speeds up die work by as much as 50 to 100 times. **Even sharpens carbide dies.**

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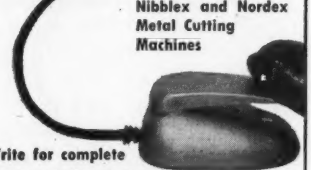

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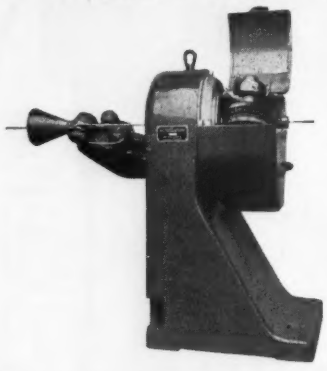

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Copper and Copper-Alloy Specification Index

Publication of a tabbed, easy-to-use, 24-page reference manual containing the latest copper and copper-alloy specifications, is announced by **The American Brass Company,** an Anaconda subsidiary. Included in this completely revised edition are ASTM, ASME, AWS, SAE, AMS, Federal, Military, Army, Navy, and Joint Army-Navy specifications. The new index is divided into two sections. The first is a list of the most generally used alloys made by the company, together with the applicable specifications of the agencies. The second section lists specifications in numeric order with a brief description of the material as to alloy, grade, type, temper, anneal, etc.

★ ★ ★

Preparation of "Copper and Copper-Alloy Specifications Index" was prompted by the Technical Department of The American Brass Company because of the growing use by industry of standard specifications of the various national engineering societies and government agencies.

★ ★ ★

Copies available free on request. Write for Anaconda Publication B-34R; The American Brass Company, Waterbury 20, Conn.

Consolidated Machine Tool Becomes Division of Farrel-Birmingham

Consolidated Machine Tool Corporation, wholly-owned subsidiary of **Farrel-Birmingham Company, Inc.** was dissolved as a separate corporation and, effective January 1, 1955, it was made a division of the parent corporation.

★ ★ ★

This announcement was made by **Franklin Hoadley,** President of **Farrel-Birmingham** and **Lester D. Chirgwin,** President of Consolidated. Activities are being continued in the Rochester division as before and management will remain the same.

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Quality Guides

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Decreases down-time and replacement cost.

HEANY INDUSTRIAL CERAMIC CORP.

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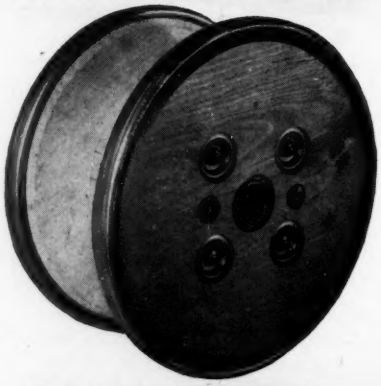

Made in 12" to 30" diameters.

No nails used. *All glued construction.* Made of kiln-dried wood. Special design prevents breaking or splintering of wood, protecting insulated wire from damage.

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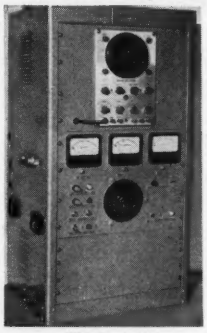

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OTHER PESCHEL PRODUCTS
Heavy Duty H. V. Dielectric test sets for large reels of cable.
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- Continuously adjustable output.
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Farrell - Birmingham acquired Consolidated as a wholly-owned subsidiary December, 1951, by purchase of the common stock from its former owner, the late **Arthur H. Ingle.** Mr. Ingle had formed the Consolidated Corporation in 1922 by merging the interests of several well known machine tool builders, some of which date back nearly to the time Farrel-Birmingham was founded, well over a century ago. Shortly after the purchase, Mr. Ingle became a director of Farrel-Birmingham, and he remained on the board until his passing July 1, 1954.

New Hook-up Wire Offers Exceptional Resistance to Abrasion and Wide Temperature Ranges

The Tensolite Insulated Wire Company announces production of a super-rugged line of hook-up wires utilizing extruded teflon insulation.

★ ★ ★

The new Hook-up Wire features an extruded teflon insulation to provide super service performance wherever abrasion or a wide range of temperatures are encountered. These new conductors are especially recommended for motor and transformer leads and similar severe service. The wires function in temperatures from—90 to +250°C.

★ ★ ★

Both solid and stranded conductor types are available. Sizes range from 10 AWG to 32 AWG. A choice of ten colors are supplied in Types E and EE to MIL-W-16878-A specifications. Wall thicknesses can be either 10 mils or 15 mils.

★ ★ ★

All the new extruded insulation types are made to the rigid standards of production. Quality is carefully controlled through all stages of production and every foot is thoroughly inspected prior to shipment.

★ ★ ★

For complete information readers are invited to write to the company at 196 Main Street, Tarrytown, N. Y.

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METAL CUTTER

Here's the tool for quick, efficient, easy cutting of medium hard wire and rods up to 5/8". Cuts anywhere! In the shop or on the job! Utilizes hand power only – exclusive toggle joint multiplies man power eighty times. In six different sizes and capacities.

Also available with rounded cutting edges for harder metals.

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Music Wire for Industrial Purposes
211 sizes Bright Polished, .0015" to .3437"
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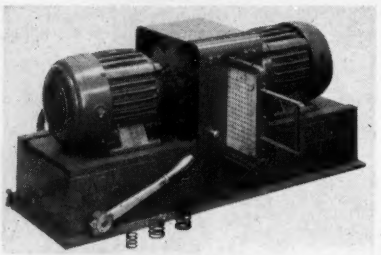
New Spring Grinder

A new type spring grinder has been developed and is being manufactured by **The Carlson Co.,** 277 Broadway, New York 7, N. Y.

★ ★ ★

It was brought out in response to many requested for a small grinder capable of handling small production orders for up to around 5000 springs. The grinder can be used for small orders, of 100



Carlson New Spring Grinder. ★ ★ ★ ★

springs or less or for production of large quantities, if desired.

★ ★ ★

Other uses, as for grinding ball bearings, piston rings, etc., are possible. Grinding wheels are 2 standard 10" diameter, 1" thick, steel backed aluminum oxide abrasive discs.

★ ★ ★

It will handle wire in diameters of from .010" to .625 and spring diameters from 1/8" to 1½" in lengths from 1/8" to 4½". 25 to 100 springs can be ground at one time.

★ ★ ★

A bulletin giving complete details and dimensions is available upon request to the company.

Bulletin on Brazing

A new bulletin on low-temperature brazing has been issued by **Handy and Harman,** 82 Fulton St., New York 38, N. Y.

★ ★ ★

This bulletin describes and illustrates how many metal parts may be joined quickly and economically, using Easy-Flow or Sil-Flos.

★ ★ ★

For a copy, write the company asking for Bulletin No. 67.

Hot Dip Galvanizing Is A Science

(*Continued from page* 170)

ing ship plates, is to keep from burning the zinc coating off, due to excessive heat held by the thick steel plates. A minimum temperature of 820 to 825 degrees F. keeps the zinc coating from burning off. This is due to the smaller gap to the freezing point of the zinc on the surface.

★ ★ ★

The fact that the galvanizing principle, the higher the bath temperature, the heavier the zinc will be deposited as coating, and vice versa, the lower the bath temperature, the lighter the zinc will be deposited as galvanized coating, is known, immediately brings up the important question as to what a company is going to do, like a metal ware company for example, that may galvanize hundreds of different sizes, kinds, and shapes of articles. There is only one correct answer to that question, and the same answer applies to wire galvanizers and all other fields of hot dip galvanizing, namely, a standard for each separate article has to be set up by a test which will determine the best operating conditions to give the highest quality product at the lowest cost. A typical example of the test required has been given above, and that is the only way that a proper standard can be arrived at.

★ ★ ★

The writer spent over two years and galvanized hundreds of different kinds of articles in tests so that once and for all, standard galvanizing conditions, costs, and quality could be used. It is a long, tedious method to determine accurately what galvanizing costs are, but in the end it pays well because the results obtained place vital technical facts and information in the hands of the cost department to meet the stiffest kind of competition with absolute safety. Some companies use their cost formulas that have been set up over years of practical operation. This is far better than estimating roughly what the costs are, but neither method can compare

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Silver Coated Copper Wire
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NEVA-TARN—Metallic Yarns—Non Tarnish—
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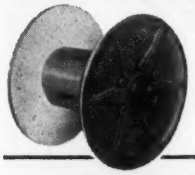
RUGGED STEEL HEAVY DUTY PROCESSING REELS



Having trouble with light weight reels failing in heavy duty service? Send us a sketch or print stating the limiting dimensions and service required, we'll be glad to tell you about our facilities for supplying the wire rope and cable industry with special heavy duty processing reels, spools or bobbins. WRITE FOR BULLETIN 52-W.

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FOR EXTRUDING COATINGS
Single and Multiple Conductor Wires

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Bath temperature has a direct bearing on production. For example, it would not be good operating practice to raise the bath temperature for one kind of article, and then schedule an article that required a low bath temperature to follow. This brings up the point of flexibility. When the galvanize pot is small, the bath temperature can be raised and lowered fairly quickly. However on extremely large galvanizing pots that may hold up to 200 tons and over of molten zinc, it is neither possible nor practical to attempt to change the bath temperature very much. In one very large structural steel galvanizing plant the operating practice found to give the very best results was to hold the bath temperature at 840 degrees day and night, and a special recording chart with a red line at 840 degrees F. was purchased so that the operators could hold the bath temperature as near to 840 degrees F. as possible.

★ ★ ★

Galvanizing bath temperatures that are correct for one line of articles, may be too low or too high for another line. As a typical illustration it is seen that in the example given with cement pails, the best operating bath temperature was found to be 865 degrees F., with a production of 96 pieces per hour. A 12-quart light gage water pail is also hot dip galvanized at a bath temperature of 865 degrees F., but the production instead of being 96 pieces per hour, is 18 dozen, or 216 pieces per hour.

★ ★ ★

Since all steel no matter whether in the form of wire or some other article such as a malleable iron casting, an angle, a water pail, or a hot water tank, has to come to the bath temperature before it can be properly hot dip galvanized, this fact has a direct bearing on how many pounds of steel or iron can be put through the bath per hour. Although some incredible instances and cases have come to light, as an ordinary thing when

the hot dip galvanizing principles are badly out of line, an early pot failure results.

★ ★ ★

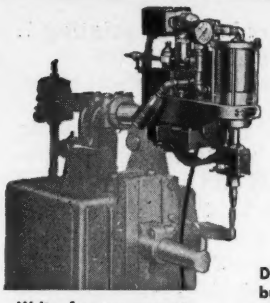
As mentioned before, it was not until combustion engineers and galvanizing furnace designers took into account, and learned some of the basic hot dip galvanizing principles, then and only then, were the important strides in the science of galvanizing made. Usually the galvanizing practice of a company can be judged by the amount of by-products made, and the amount of seconds and work that has to be regalvanized. A skilled galvanizer can save his company hundreds of dollars, and yet his actions will not indicate how he does it. It is just the difference between knowing and not knowing.

★ ★ ★

There are many hot dip galvanizing principles. Some operate one way, and some operate the opposite way. It is exactly like a football game; two opposing sets of forces, with each individual force on each side attempting to "get loose," and with the sum total of all forces on each side, either moving ahead, or falling back, according to the skill and guiding hand of the operator. And like football, there are definite rules and conditions that govern the plays. To win in football requires skill and knowing the rules of the game; to be highly successful in hot dip galvanizing also requires skill and a good knowledge of hot dip galvanizing principles.

Hexagon Recessed Screw Production Costs Slashed by New Development in Carbide Heading Dies

Previous attempts to head hexagon recessed screws in a totally carbide die have been generally unsuccessful. A new development by **Champion Tool and Die Company** of McKeesport, Pa., now allows the tremendous bursting forces in heading hexagon recessed screws to be absorbed by a tough alloy tool steel cap. The necessary resistance to impact and



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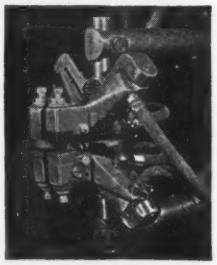

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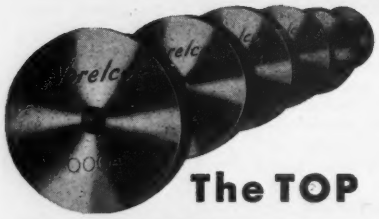

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New Firm Organized to Supply Insulating Film

A relatively new insulating film materials manufacturing firm has been organized in Pawtucket, Rhode Island, during the past few months. Young in name only—**Standard Film Products Corporation's** operations are directed by a man who can look back on a quarter century of film slitting, printing and fabricating. This man, **Charles R. Cohen,** was formerly plant superintendent of Freydberg Bros.-Strauss, Inc., in charge of their New Products Division.

* * *

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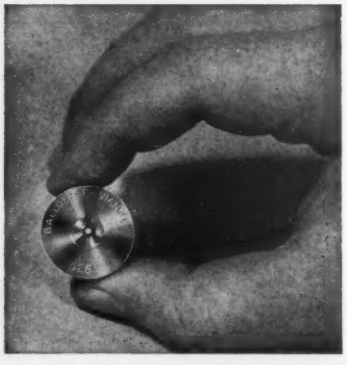

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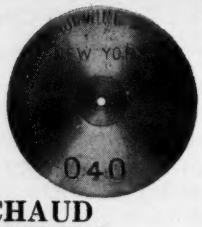

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★ ★ ★

Mr. Froelich has served in executive sales capacities with the **Pittsburgh Steel Company, Detroit Steel Corporation, Portsmouth Steel Corporation,** and **Reynolds Wire Company.** In addition, he served as an administrator of steel orders in the War Production Board during World War II.

★ ★ ★

With this past experience, Mr. Froelich brings into this new company a broad knowledge of the steel industry.

Two Versatile Alloy Steels Described in New Catalog

A newly revised catalog published by **The Carpenter Steel Company** describes two chrome-nickel alloy steels reported capable of handling 95% of all alloy jobs. One grade, Carpenter No. 158, is a case hardening steel. The other grade, Carpenter No. 5-317, can be either a hard-tempering or tough-tempering steel, depending upon heat treatment. The catalog, stressing the simplified selection permitted by use of just two steels, gives a complete description of both alloys. This includes type analysis, physical properties, working instructions and stock sizes available. Typical uses for each steel are also listed, and sample applications described. A general guide tells when to use one steel in preference to the other.

Bulletin on Carbide Dies

Carboloy Department, General Electric Co., Detroit 32, Mich., has issued a bulletin: "9 Reasons Why You Get Top Production When You Specify Carboloy Cemented Carbide Wire Dies."

★ ★ ★

This bulletin, which lists the various catalogs and services offered by the company, will be mailed to interested parties upon request.

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Brochure Describes Wire Rope Electric Hoisting Equipment

A 16 page brochure, P-495-A, published by **The Yale & Towne Manufacturing Company**, Philadelphia 15, is used to picture and describe the Yale Cable King line of wire rope electric hoists.

★ ★ ★

The brochure contains a number of illustrations, cut-away photographs, charts and diagrams providing valuable information for any company contemplating the purchase of electric hoisting equipment.

★ ★ ★

Yale Cable King wire rope electric hoists are available in capacities from one quarter to 15 tons and are air-cooled to eliminate excess heat from both motor brake and load brake. This permits the hoist to perform on a much heavier duty cycle than other hoists in the same class.

★ ★ ★

Other features are a load brake with positive lubrication, long life gears, magnetic motor brake and safety type load block and hook.

New Metallographic Laboratory Checks 20,000th Sample of Tungsten Carbide

On December 6, 1954, **Firth Sterling's** new Metallographic Department in Pittsburgh, an important part of quality control, completed examination of their 20,000th sample of tungsten carbide since the laboratory was moved here three years ago.

★ ★ ★

In this laboratory, the samples are mounted in Bakelite, ground and polished to a high, mirror-like finish for examination under the microscope. Metallographic examination for porosity is checked at a magnification of 200 diameters. The specimens are then etched in various reagents and examined at 1,500 diameters for structural constituents, segregation, size of carbide particles, and possible impurities in the material. To facilitate quality control, the laboratory is equipped to do highly specialized types of color, as well as black-and-white metallography. Firth Stirling was the first in the Carbide field to develop color metallography, a heat-tinting technique which makes possible the identification of constituents in multicarbide mixtures, not detectable through black-and-white metallography.

★ ★ ★

In addition to this extensive work in quality control, Firth Stirling's metallographers aid the company's research metallurgists in determining structural qualities of specimens resulting from new product research, such as cermets, chromium carbides, and new tungsten carbide grades.

Produces New Zipper

A new jacket zipper introduced by **Scovill Manufacturing Company**, Waterbury, Conn., had its first public showing recently at the National Outerwear and Sportswear Association convention.

★ ★ ★

The new product is said to have three important features: A notched slider that is held firmly in place and snaps into position with a hook on the bottom retainer; a blocking ridge on the tapered threading pin at the base of the zipper, which prevents the slider from moving until the pin is fully in position; a new automatic lock with fully shielded locking mechanism, along with a cap that is rigidly attached to the slider body and a solid bar on the pull tab that won't twist off.

Pocket-Size Magnet Wire Catalog Issued by Anaconda

Anaconda Wire & Cable Co.'s recently issued regular Magnet Wire Catalog (C-79-12) now has a "little brother," for the company has duplicated the large catalog in a new convenient, pocket-size form. Nothing is changed except the number of the miniature version, which is designated C-79-12A.

★ ★ ★

The company was encouraged to

New Wire Stripper

This rotary wire stripper removes film insulation. The Model L-1 unit is adapted to stripping sizes 20 to 29 AWG wire. Similar units for larger wires are available. The end of the wire is simply inserted and withdrawn — there are no pedals or levers to operate. Stripping insert can easily be resharpened on the side of a grinding wheel.

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Model "L-1" Rotary Wire Stripper is available complete for $100.00 f.o.b. Syracuse, for 1 month trial use for $11.00, or the stripping head can be purchased separately for $25.00 for attaching to the user's own high-speed (10,000 r.p.m.) motor. Rush Wire Stripper Division, **The Eraser Co., Inc.,** 1068 S. Clinton Street, Syracuse 4, New York.

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WHERE TO BUY

Only advertisers who have contracted for six or more insertions are listed in this section.

ABRASIVES—
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Norton Co., Worcester, Mass.
Union Wire Die Corp., New York, N. Y.

ACID INHIBITORS—
(See Inhibitors, Pickling)

ACID-PROOF CONSTRUCTION—
Chemstee Construction Co., Inc., Pittsburgh, Pa.
Haveg Corporation, Newark, Del.

ANNEALING MACHINES — Electric Resistance
Syncro Machine Co., Perth Amboy, N. J.

ANNEALING POTS AND BOXES—
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

BAKERS—
(See OVENS—Rod Bakers)

BOBBINS—Braider & Wire Weaving
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket. R. I.

BORAX—Wire Drawing
Pacific Coast Borax Co., New York, N. Y.

BORON CARBIDE—
Norton Co., Worcester, Mass.

CABLE FILLERS—Paper
Plymouth Cordage Company, Plymouth, Mass.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket. R. I.

CASTINGS—Wire Mill
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Phila., Pa.
Metal & Thermit Corp., New York, N. Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Parkin Chemical Co., The, Pittsburgh, Pa.
Standard Industrial Compounds Co., Chicago.

CLEANING & PICKLING EQUIP.—
Chemsteel Construction Co., Pittsburgh, Pa.
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, O.
Haveg Corporation, Newark, Del.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio
Youngstown Welding & Eng'g Co., Youngstown, Ohio.

CLOTH—WIRE, All Metals
Chase Brass & Copper Co., Waterbury, Conn.
Wickwire Bros., Cortland, N. Y.

COATINGS—Cable, Electric
Carbro Chemical Company, Pawtucket, R. I.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y
Standard Industrial Compounds Co., Chicago

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.
Miller, R. H. Co., Inc., Homer, N. Y.

COMPOUNDS—Diamond (Pre-Mixed)
Eastern Carbide Corp., New Rochelle, N. Y.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago.
Rusch Wire Die Corporation, Croton-on-Hudson, N. Y.
Union Wire Die Corp., New York, N. Y.
United States Industrial Diamond Corp., New York, N. Y.

COMPOUNDS—Extrusion, for Wire
(See COMPOUNDS—Vinyl)

COMPOUNDS—For Improving Drawing and Extrusion
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Metal & Thermit Corp., New York, N. Y.

COMPOUNDS—Phosphate Coating
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corporation, Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Cook, Adam Sons Inc., Linden, N. J.
Magnuson Products Corporation, Brooklyn, N. Y.
Standard Industrial Compounds Co., Chicago.

COMPOUNDS—Vinyl, for Wire
Electronic Rubber Co., Stamford, Conn.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Cook, Adam Sons Inc., Linden, N. J.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H. Co., Inc., Homer, N. Y.
Nopco Chemical Co., Harrison, N. J.
Pacific Coast Borax Co., New York, N. Y.
Standard Industrial Compounds Co., Chicago.
Swift & Company, Chicago, Ill.

CONDUCTORS—Flexible, Electrical
Montgomery Co., The, Windsor Locks, Conn.

CONTAINERS—Wire Packaging
(See DRUMS—Wire Packaging)

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire & Textile Mach'y, Inc. (used) Pawtucket. R. I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Carboloy Dept. of General Electric Co., Detroit.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Metal Carbides Corporation, Youngstown, Ohio
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Utica Drop Forge & Tool Corp., Utica, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.

CUTTING TOOLS—Wire
Porter, H. K. Inc., Somerville, Mass.

DIAMONDS—Industrial
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
United States Industrial Diamond Corp., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDERS—
Danforth, The C. W. Co., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Research Company, St. Clair Shores, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson. N. Y.
Union Wire Die Corp., New York, N. Y.
United States Industrial Diamond Corp., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDER RECLAIMING—
Danforth, The C. W. Co., Youngstown, Ohio
Kay & Warren Co., Brooklyn, N. Y.
Kelly Wire Die Corp., New York, N. Y.
National Research Co., St. Clair Shores, Mich.
Rusch Wire Die Corp., Croton-on-Hudson. N. Y.
Union Wire Die Corp., New York, N. Y.

DIAMOND TOOLS—
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Carbide, Tungsten & Tantalum
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Carboloy Dept. of General Electric Co., Detroit.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Hontan Corporation, Yonkers, N. Y.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Union Wire Die Corp., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Cold Heading
Carboloy Dept. of General Electric Co., Detroit
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Hontan Corporation, Yonkers, N. Y.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Vascoloy-Ramet Corp., Waukegan, Ill.

DIES—Diamond
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Cochaud Wire Die Inc., New York, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
North American Philips Co., Inc., Elmet Div., Lewiston, Me.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Union Wire Die Corp., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.

DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc, New York, N. Y.
Carboloy Dept. of General Electric Co., Detroit.
Cochaud Wire Die Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Ft. Wayne Wire Die., Inc., Fort Wayne, Ind.
Hontan Corporation, Yonkers, N. Y.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
North American Philips Co., Inc., Elmet Div., Lewiston, Me.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Hontan Corporation, Yonkers, N. Y.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Union Wire Die Corp., New York, N. Y.

DIES—Swaging
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Dept. of General Electric Co., Detroit.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Hontan Corporation, Yonkers, N. Y.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y
Vascoloy-Ramet Corp., Waukegan, Ill.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRUMS—Wire Packaging
Continental Can Company, Ven Wert, Ohio

DRUMS & TRAVERSES—For Cable Reels
Hubbard Spool Co., Garrett, Ind.
New York Engineering Co., Yonkers, N. Y.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio

DRYING EQUIPMENT
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio.
Rockwell, W. S. Co., Fairfield, Conn.

ENGINEERS—Consulting
Lubricants—Hans C. Bick, Inc., Reading, Pa.
Wire Mill—Clarence S. Arms, Worcester, Mass.
Seymour, Leroy D., Trenton, N. J.
Zinc—Imhoff, Wallace G. Co., Los Angeles, Calif.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FENCING & FENCES—Wire
Interlocking Fence Co., Morton, Ill.

FILM—Insulating
Standard Film Products Corp., Pawtucket, R. I.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Galvanizing Equipment
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

FURNACES—Heat Treating
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Drever Company, Phila., Pa.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio

FURNACES—Pot (oil, gas, electric)
Ajax Electric Co., Inc., Philadelphia, Pa.

FURNACES—Resistance Heating, Strand
(See Annealing Machines)

FURNACES—Salt Bath
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio

GALVANIZING EQUIPMENT — (See MACHINERY—Galvanizing Wire)

GRINDERS—Roll
Norton Co., The, Worchester, Mass.

GUIDES—For Wire
Heany Industrial Ceramic Corp., New Haven, Conn.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HARDSURFACING ALLOYS—
(See Alloys—Hardsurfacing)

HOOKS—Pickling & Liming
Youngstown Welding & Eng'g' Co., Youngstown, Ohio

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INSULATING MATERIALS—
Carbro Chemical Company, Pawtucket, R. I.
Celanese Corporation of America, New York, N. Y.
Chemical Products Co., E. Providence, R. I.
Electronic Rubber Co., Stamford, Conn.
Heineman Corp., Oscar, Chicago, Ill.
Merrimac Paper Co., New York, N. Y.
Pittsburgh Plate Glass Company, Pittsburgh, Pa.
Plymouth Cordage Company, Plymouth, Mass.
Standard Film Products Corp., Pawtucket, R. I.
Synthetic Thread Corporation, Bethlehem, Pa.

INSULATING MATERIALS — Paper—For Electric Wire Cable
Merrimac Paper Co., New York, N. Y.
Plymouth Cordage Company, Plymouth, Mass.

LACQUERING SYSTEMS — See MACH.—Lacquering Electric Wire

LACQUERS—For Electric Wire
Chemical Products Co., E. Providence, R. I.

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LIME—
Warner Co., The, Philadelphia and Bellefonte, Pa.

LUBRICANTS — For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Cook, Adam Sons Inc., Linden, N. J.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Nopco Chemical Co., Harrison, N. J.
Standard Industrial Compounds Co., Chicago.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany

MACHINERY—Braiding
Fidelity Machine Co., Inc., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Wardwell Braiding Mach. Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Providence, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Inc., Philadelphia, Pa.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
New York Engineering Co., Yonkers, N. Y.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Machinery—Winding Wire)

MACHINERY—Centerless Grinding
Schumag Schumacher Metallwerke, Aachen, Germany.

MACHINERY—Chain Making
Cosa Corporation, New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany

MACHINERY—Closing Rope
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Cold Heading
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Copper Wire Drawing
Aetna-Standard Engineering Co., Pittsburgh.
American Insulating Mach'y Co., Phila., Pa.
National Mach'y Exch. (Used), New York.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Crimping Wire
Cedar West Tool Co., New York, N. Y.

MACHINERY—Cutting
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Utica Drop Forge & Tool Corp., Utica, N. Y.
Wells, Frank L., Co., Kenosha, Wis.

MACHINERY—Descaling Rod, Dry
Fisher Associates, New York, N. Y.
Herborn, Herborn, Germany.

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Carboloy Dept. General Electric Co., Detroit, Mich.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Firth Sterling, Inc., Pittsburgh, Pa.
International Wire Products Co., Midland Pk., N. J.
Nord International Corporation, Orange, N. J.
Union Wire Die Corp., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Electrode Grinding
Cosa Corporation, New York, N. Y.

MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, Ohio
International Wire Products Co., Midland Pk., N. J.
Rockwell Co., W. S., Fairfield, Conn.

MACHINERY—Extruding
Aetna-Standard Engineering Co., Pittsburgh.
Davis-Standard Sales Corp., Mystic, Conn.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Fence
Blashill and Company, Arthur, Worcester, Mass.
Glader, Wm., Machine Works, Chicago, Ill.
Interlocking Fence Co., Morton, Ill.

MACHINERY—Flat Wire
Fenn Manufacturing Co., Newington, Conn.
Mettler Machine Tool, Inc., New Haven, Conn.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming Wire
Baird Machine Co., Stratford, Conn.
Karl Hack, Reutlingen (Wurtt), Germany
Nilson, A. H., Machine Co., Bridgeport, Conn.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany

MACHINERY—Fourdrinier Looms
Cedar West Tool Co., New York, N. Y.

MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle, Jas. L. Co., Providence, R. I.
International Wire Products Co., Midland Pk., N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Karl Hack, Reutlingen (Wurtt), Germany
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating Wire
Aetna-Standard Engineering Co., Pittsburgh, Pa.
American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Sales Corp., Mystic, Conn.
Fidelity Machine Co., Inc., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Mach. Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Inc., Philadelphia, Pa.

MACHINERY—Lacquering Electric Wire
American Insulating Mach'y Co., Philadelphia.
Cook Mfg. Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, O.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
Cedar West Tool Co., New York, N. Y.
Interlocking Fence Co., Morton, Ill.
Mummert-Dixon Co., Hanover, Pa.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Baird Machine Co., The Stratford, Conn.
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.
Seybold Transworld Exporters, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany

MACHINERY—Packaging Wire
Coulter & McKenzie Machine Co., Bridgeport, Conn.

MACHINERY—Pickling
Chemsteel Construction Co., Pittsburgh, Pa.
Youngstown Welding & Eng'g Co., Youngstown, Ohio.

MACHINERY—Pin Making
Baird Machine Co., The, Stratford, Conn.
Cosa Corporation, New York, N. Y.

MACHINERY—Pointing
Aetna-Standard Engineering Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury Conn.

MACHINERY—Poultry Wire Fencing
Interlocking Fence Co., Morton, Ill.

MACHINERY—Re-Spooling
Boyd & Sons Manufacturing Corp., Philadelphia, Pa.
Cedar West Tool Co., New York, N. Y.
Emory, Robert J., Co., Newark, N. J.
International Wire Products Co., Midland Pk., N. J.
Mummert-Dixon Co., Hanover, Pa.
National Mach'y Exch. (Used), New York, N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.
Wire Insulating Machy., Div. of Machinery Electrification, Inc., Northboro, Mass.

MACHINERY—Rod Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

Schumag Schumacher Metallwerke, Aachen, Germany

MACHINERY—Rolling Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Sales Corp., Mystic, Conn.
Royle, John & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Serving
Fidelity Machine Co., Phila., Pa.
Fourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Spark Testing
Peschel Electronics, Inc., New Rochelle, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Spring Making
Karl Hack, Reutlingen (Wurtt), Germany
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Spring Testing
Emmericher Maschinenfabrik, Emmerich, Germany

MACHINERY—Staple
Seybold Transworld Exporters, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt, Germany.

MACHINERY—Straightening & Cutting
Continental Fdy & Machine Co., Medart Division, Pittsburgh, Pa.
Cosa Corporation, New York, N. Y.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Stranding
Haskell-Dawes Machine Co., Philadelphia, Pa.
Milton Machine Works, Inc., Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Studmaking
Cosa Corporation, New York, N. Y.

MACHINERY—Swaging
Fenn Manufacturing Co., Newington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out
Aetna-Standard Engineering Co., Pittsburgh, Pa.
American Insulating Mach'y Co., Phila., Pa.
Blashill and Company, Arthur, Worcester, Mass.
Davis-Standard Sales Corp., Mystic, Conn.
Fenn Manufacturing Co., Newington, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
International Wire Products Corp., Midland Park, N. J.
New York Engineering Co., Yonkers, N. Y.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.
Wire Insulating Machy., Div. of Machinery Electrification, Inc., Northboro, Mass.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Testing Magnet Wire Coatings for Pin Holes
Peschel Electronics, Inc., New Rochelle, N. Y.

MACHINERY—Testing, Physical
Emmericher Maschinenfabrik, Emmerich, Germany
Scott Testers, Inc., Providence, R. I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
International Wire Products Corp., Midland Park, N. J.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill, Cold Drawing
Aetna-Standard Engineering Co., Pittsburgh, Pa.
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Turks Head
Fenn Manufacturing Co., Newington, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Providence, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
International Wire Products Corp., Midland Park, N. J.

MACHINERY—Used
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot)

MACHINERY—Washer Forming
Cosa Corporation, New York, N. Y.

MACHINERY—Winding Wire
Cedar West Tool Co., New York, N. Y.
Emory, Robert J., Newark, N. J.
Fenn Manufacturing Co., Newington, Conn.
Mummert-Dixon Co., Hanover, Pa.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.
Wire Insulating Machy., Div. of Machinery Electrification, Inc., Northboro, Mass.

MACHINERY—Wire Drawing
Aetna-Standard Engineering Co., Pittsburgh, Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Fenn Manufacturing Co., Newington, Conn.
Herborn, Herborn, Germany
International Wire Products Corp., Midland Park, N. J.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N. Y.
Schumag Schumacher Metallwerke, Aachen, Germany
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Forming
Baird Machine Co., The, Stratford, Conn.
Cosa Corporation, New York, N. Y.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Rope
Milton Machine Works, Inc., Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

NAIL TOOLING—Tungsten Carbide
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Brothers, Inc., Cortland, N. Y.

NOZZLES—For Extruding Machines
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

OVENS—Cable Lacquering
American Insulating Mach'y Co., Phila, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Rockwell Co., W. S., Fairfield, Conn.

OVENS—Rod Bakers
Carl-Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAPER—Creped Wrapping
Arkell Safety Bag Company, New York, N. Y.
National Waterproof Papers, Inc., Beverly, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
Arkell Safety Bag Company, New York, N. Y.
National Waterproof Papers, Inc., Beverly, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—Insulating
Plymouth Cordage Co., Plymouth, Mass.

PATENT ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PICKLING—Hooks, etc. Acid Resisting
Youngstown Welding & Eng'g Co., Youngstown, Ohio

PICKLING TANK LININGS—
Chemsteel Construction Co., Pittsburgh, Pa.
Haveg Corp., Newark, Del.

PIPES & FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

PLASTICS—for Wire Insulation
Electronic Rubber Co., Stamford, Conn.

PLIERS—For Wire
Utica Drop Forge & Tool Corp., Utica, N. Y.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio

PRESSES—Hydraulic and Mechanical
Aetna-Standard Engineering Co., Pittsburgh, Pa.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, Ohio

PUMPS—Molten Metal
Fisher Associates, New York, N. Y.

REEL AND TENSION STANDS—
Fidelity Machine Company, Inc., Philadelphia
Industrial Ovens, Inc., Cleveland, Ohio.
New York Engineering Co., Yonkers, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire Insulating Machy., Div. of Machinery Electrification, Inc., Northboro, Mass.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Inc., Milton, Pa.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio

REELS—Metal Bound
Durkee Mfg. Co., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., Wm., Westport, Mass.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS—Plywood
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., Wm., Westport, Mass.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Garrett, Ind.
Mason Can Company, East Providence, R. I.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Co., Yonkers, N. Y.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Durkee Mfg. Co., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
Mason Can Company, East Providence, R. I.
McCaskie, Inc., Wm., Westport, Mass.
Mettler Machine Tool, Inc., New Haven, Conn.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Co., Yonkers, N. Y.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wooden
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., Inc., The, Hazardville, Conn.
Durkee Mfg. Co., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Co., Cleveland, Ohio
Crucible Steel Co. of America, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Steel
Crucible Steel Co. of America, Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Chase Brass & Copper Co., Waterbury, Conn.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Titan Metal Manufacturing Co., Bellefonte, Pa.

RODS—Wire, Steel
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Sheffield Steel Corp., Kansas City, Mo.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
American Steel & Wire Company, Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—Rust Preventing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—Rust Preventing)

SATURANTS—Cable
Carbro Chemical Company, Pawtucket, R. I.

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio
New York Engineering Co., Yonkers, N. Y.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—(See Reels & Spools)

SPOOLS—Stamped Metal for Retail Wire Sales
Clark, J. L. Mfg. Co., Rockford, Ill.
Mason Can Co., East Providence, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

STRIPPERS—Wire, Electric
Utica Drop Forge & Tool Corp., Utica, N. Y.

TANKS—Compound
National Annealing Box Co., Washington, Pa.
New York Engineering Co., Yonkers, N. Y.
Watson Machine Co., Paterson, N. J.

TANKS—Pickling and Plating
Chemsteel Construction Co., Pittsburgh, Pa.
National Annealing Box Co., Washington, Pa.

TESTERS — INSULATION
(See MACHINERY—Spark Testers)

TESTING EQUIPMENT
(See MACHINERY Testing, Physical and Diameter Testing)

TINNING PROCESS—
Metal & Thermit Corp., New York, N. Y.

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper, Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

TOOLS—Die Cutting and Finishing
Nord International Corporation, Orange, N. J.

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.

TOOLS—Welding Wire, Strip & Foil (Pressure)
Utica Drop Forge & Tool Corp., Utica, N. Y.

TOOLS—Wire Cutting
Porter, H. K. Inc., Somerville, Mass.
Utica Drop Forge & Tool Corp., Utica, N. Y.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRANSMISSIONS—Variable speed (See Machy—Power Transmission)

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.
Wire Insulating Machy., Div. of Machinery Electrification, Inc., Northboro, Mass.

VALVES & FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VARNISHES & LACQUERS—for Electric Wire
Carbro Chemical Co., Pawtucket, R. I.
Chemical Products Co., E. Providence, R. I.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire Insulating Machy., Div. of Machinery Electrification, Inc., Northboro, Mass.

WELDERS—Spot and Butt
Hoffman Co., Robt. W., Chicago, Ill.
Micro Products Co., Chicago, Ill.
Utica Drop Forge & Tool Corp., Utica, N. Y.

WIRE—Aluminum
Elmet Division, North American Philips Company, Inc., Lewiston, Maine
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Malin & Co., The, Cleveland, Ohio
Scovill Mfg. Co., Waterbury, Conn.

WIRE—Barbed
Interlocking Fence Co., Morton, Ill.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass
Chase Brass & Copper Co., Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Spencer Wire Corp., Union, N. J.
Titan Metal Manufacturing Co., Bellefonte, Pa.

WIRE—Brush
Spencer Wire Corp., Union, N. J.

WIRE—Bunched & Stranded, Copper
Camden Wire Co., Camden, N. Y.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Co., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Camden Wire Co., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
Titan Metal Manufacturing Co., Bellefonte, Pa.
Wickwire Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Copper
Chase Brass & Copper Co., Waterbury, Conn.
Spencer Wire Corp., Union, N. J.

WIRE—For Electrical Conductors
Camden Wire Co., Camden, N. Y.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.

WIRE—Flat, Fine
Elmet Division, North American Philips Company, Inc., Lewiston, Maine
Montgomery Co., The, Windsor Locks, Conn.

WIRE—Galvanized
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Manufacturers
American Steel & Wire Co., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark, N. J.
North American Philips Co., Inc., Elmet Division, Lewiston, Me.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
Spencer Wire Corp., Union, N. J.
Titan Metal Manufacturing Co., Bellefonte, Pa.
U. S. Steel Co., N. Y., N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Music
American Steel & Wire Co., Cleveland, Ohio
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio
Spencer Wire Corp., Union, N. J.

WIRE—Needle
Carpenter Steel Company, Webb Wire Division, New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Alloy Metal Wire Div., H. K. Porter Co., Inc., Pittsburgh, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Malin & Co., The, Cleveland, Ohio
Titan Metal Manufacturing Co., Bellefonte, Pa.

WIRE—Oil Tempered
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.

WIRE—Silver Plated Copper
Camden Wire Co., Camden, N. Y.

WIRE—Special Shapes
Alloy Metal Wire Div., H. K. Porter Co., Inc., Pittsburgh, Pa.
Crucible Steel Co. of America, Pittsburgh, Pa.
Continental Steel Corp., Kokomo, Ind.
National Lock Washer Company, The, Newark, N. J.
Titan Metal Manufacturing Co., Bellefonte, Pa.

WIRE—Spring
Alloy Metal Wire Div., H. K. Porter Co., Inc., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Co., Cleveland, Ohio
Carpenter Steel Company, Webb Wire Div., New Brunswick, N. J.
Crucible Steel Co. of America, Pittsburgh, Pa.
Firth Sterling, Inc., Pittsburgh, Pa.
Major Co., J., Chicago, Ill.
National Lock Washer Company, The, Newark, N. J.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Steel—Also Coppered and Galvanized Steel
Alloy Metal Wire Div., H. K. Porter Co., Inc., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Major Co., J., Chicago, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Spencer Wire Corp., Union, N. J.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Major Co., J., Chicago, Ill.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Tinned Copper
Camden Wire Co., Camden, N. Y.

WIRE—Tungsten
North American Philips Co., Inc., Elmet Division, Lewiston, Me.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARNS & TAPES—Insulating
Celanese Corporation of America, New York, N. Y.
Heineman Corp., Oscar, Chicago, Ill.
Pittsburgh Plate Glass Company, Pittsburgh, Pa.
Standard Film Products Corp., Pawtucket, R. I.
Synthetic Thread Corporation, Bethlehem, Pa.

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 3, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

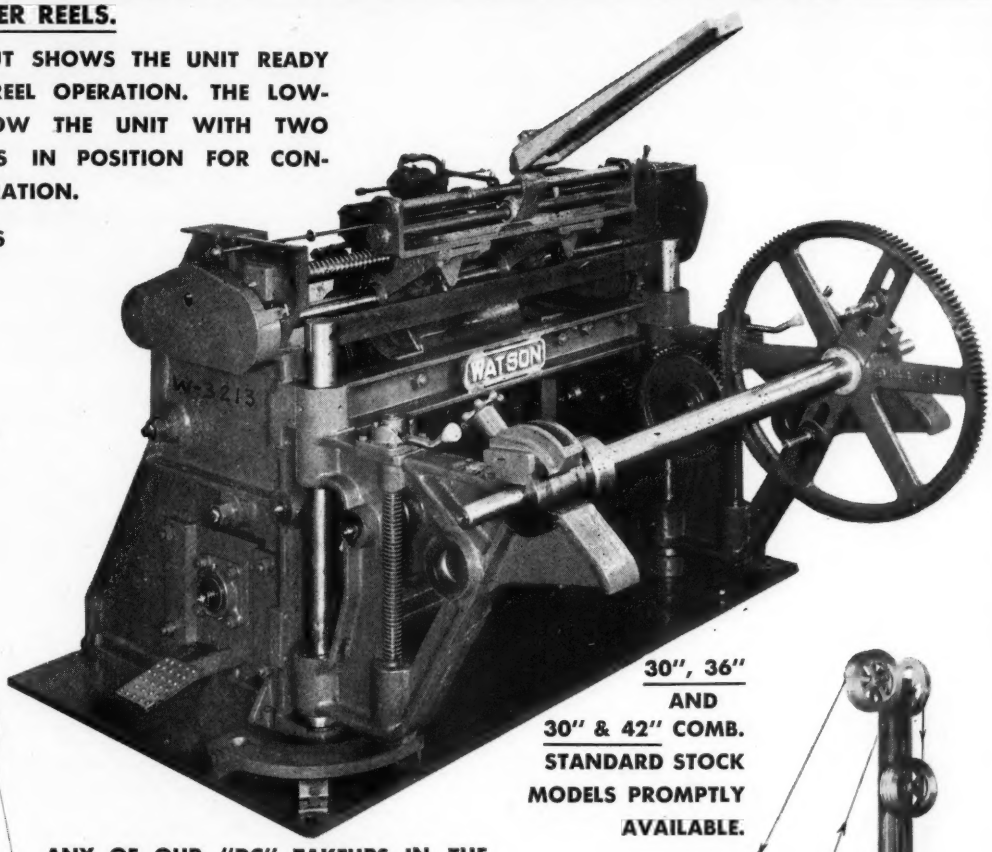
WATSON

TAKEUPS TYPE "DC"

THIS DOUBLE PURPOSE "COMBINATION" MODEL OPERATES WITH SINGLE LARGE REELS AND QUICKLY CONVERTS TO A CONTINUOUS TAKEUP OPERATING WITH TWO SMALLER REELS.

THE UPPER CUT SHOWS THE UNIT READY FOR SINGLE REEL OPERATION. THE LOWER CUTS SHOW THE UNIT WITH TWO SMALLER REELS IN POSITION FOR CONTINUOUS OPERATION.

IN BOTH CASES THE TAKEUP FUNCTIONS WITHOUT FRICTION-SLIP, AND THE WINDING TENSION REMAINS UNIFORM DURING THE REEL-RUN BUILD-UP.



30", 36" AND 30" & 42" COMB. STANDARD STOCK MODELS PROMPTLY AVAILABLE.

ANY OF OUR "DC" TAKEUPS IN THE FIELD CAN EASILY BE CONVERTED TO "COMBINATION" MODELS BY SUPPLY OF ADDITIONAL PARTS, WITHOUT DISTURBING THE TAKEUP LOCATION.

Machine bulletin 010553 available.

2-55

Typical EF Installations

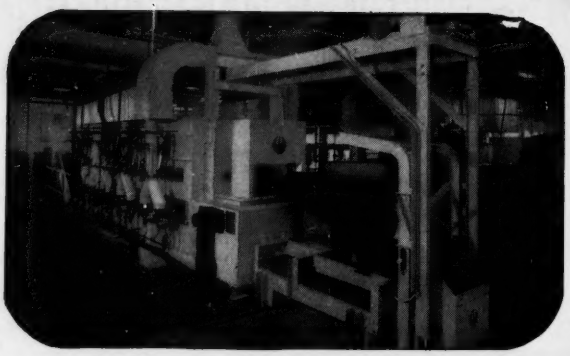
For the utmost in dependable, efficient, low cost service, specify an EF furnace. Built in roller hearth, roller rail, chain belt, car type, wire belt and many other designs. Complete with special atmosphere generators and material handling facilities. Gas fired, oil fired, or electrically heated for any heating or heat-treating operation — any process — any product — and any capacity requirement. Let the EF engineers, with their long and successful experience in engineering and building furnaces, work with you on your next heat treating job.

THE ELECTRIC FURNACE COMPANY

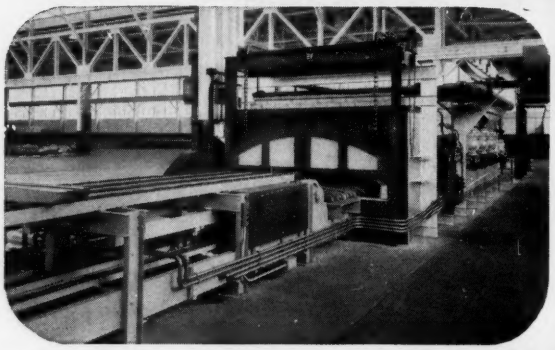
Gas Fired, Oil Fired and Electric Furnaces

Wilson Street, Salem, Ohio

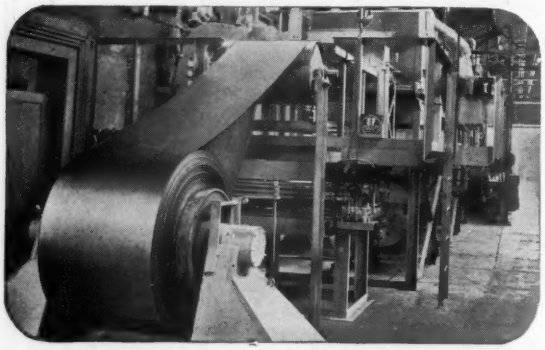
Canadian Associates • CANEFCO LIMITED • Toronto 1, Canada



Small parts, headed, drawn, forged or stamped are heat-treated without scale or decarburization—uniformly and economically—in EF chain belt furnaces. Capacities to meet any requirement.

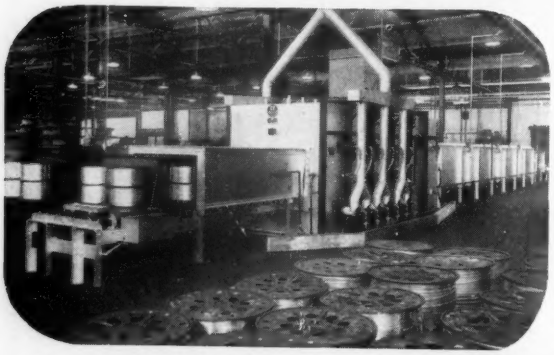


Bars and billets are scale-free heated for rolling, drawing or other processing in EF pusher, rotary and other types of special atmosphere furnaces. Any capacity, atmosphere or temperature.

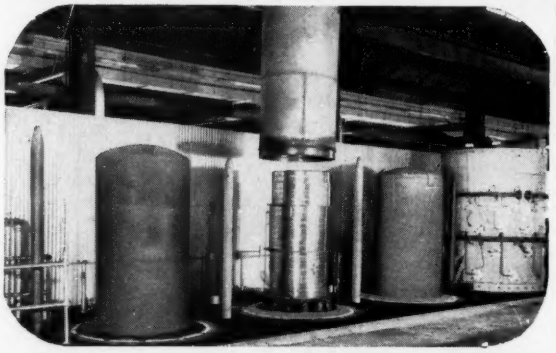


Continuous Strip Lines for annealing, normalizing, galvanizing, aluminizing and for producing various surface and metallurgical conditions on ferrous and nonferrous strip.

Nickel-silver and other alloy wire and strip is clean and scale-free annealed in EF furnaces. Furnished complete with special atmosphere and desulphurizing units.



Ferrous and non-ferrous wire on reels, spools, coils and strands is bright annealed uniformly and continuously in EF special atmosphere furnaces. Capacities for any requirement.



Carbon, alloy and non-ferrous wire, strip and other products are annealed, carburized or nitrided in EF bell type furnaces. Cycles readily changed to suit the process.